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W AND ENLARGED MANUAL

(THIRD EDITION)

PRACTICAL

Strawberry and General Berry Fruit Culture

ALSO OF

GRAPES, ASPARAGUS, RHUBARB, ETC.

BY O. W. BLACKNALL,

VICE-PRESIDENT NORTH CAROLINA HORTICULTURAL SOCIETY,

Editor of The Strawberry Specialist, and President and General Manager of the Continental Plant Company,

KITTRELL, N. C.

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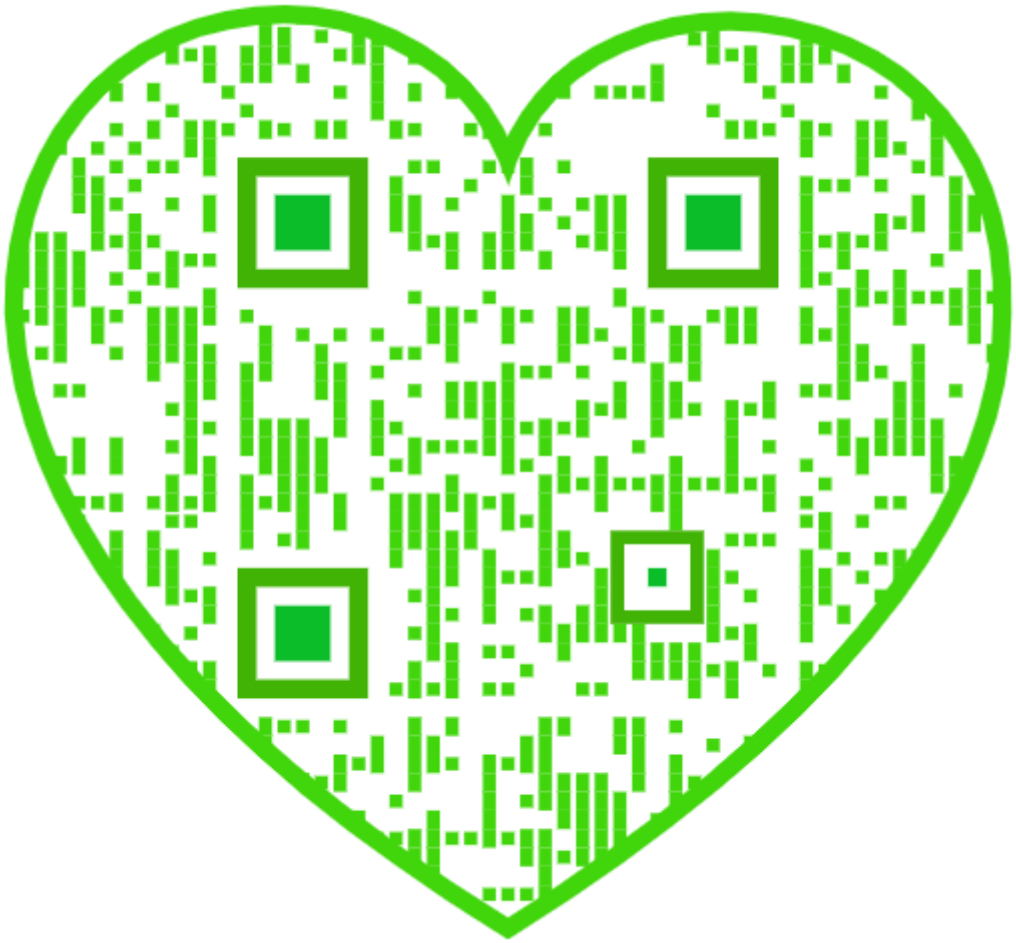

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Strawberry and General Berry Fruit Culture

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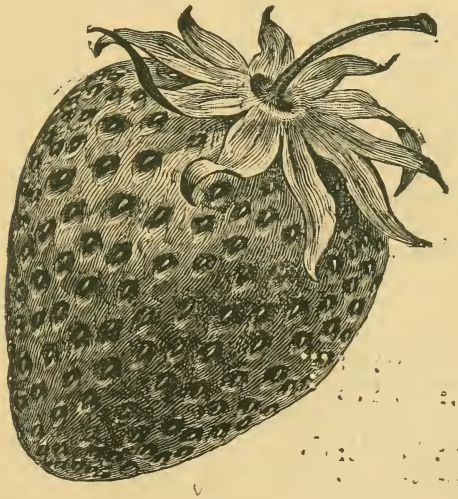

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FOREWORD.

It has been said that, as a rule, farm and fruit writers write not out of the fulness of their experience but of their inexperience. While not admitting the truth of this charge against any considerable number of his co-writers, the author of this treatise can, without hestitation, deny it in his own case.

He planted his first strawberries a little less than twenty-nine years ago. For nearly nineteen years he has devoted his time exclusively to the scientific and practical study of this fruit, as a grower on an ever-increasing scale. For nearly as long he, while writing much on the subject, has been an attentive reader of what others had to say touching his calling.

But the information embodied herein, be it wise or unwise, was learned, or proven, in the school of experience—stern, strict school, whose tuition comes high, but which teaches deep and true.

He has succeeded; and such prestige as success—success against many odds—deserves he is entitled to. In the pages that follow he strives to give the essential and useful parts of this experience, hoping to make the rough and steep pathway to success smoother for others than he found it himself; for he traveled it largely unguided, and the guides he occasionally had either did not know the way themselves or could not tell it understandingly.

O. W. BLACKNALL.

Kittrell, N. C., October 8, 1902.

CHAPTER I.

THE STRAWBERRY'S PLACE IN NATURE.

While a few of the following pages have no direct bearing on practical strawberry culture, they give information touching the strawberry that will doubtless be of interest to growers not already in possession of it.

The strawberry is a member of the great rose family—the practical, business member of the family it would be called by those who put the useful before the beautiful.

To the great natural order (or race, properly speaking), Rosaceæ, of which the rose is the type, belong the strawberry, along with its remote kindred, the plum, cherry, apple, pear, quince, service berry, hawthorn, blackberry, raspberry, etc., and meadow-sweet. The resemblance of the blossoms of all these to that of the wild rose and the rose-apple to the fruit of the apple, pear, quince, etc., must have struck observant people. They are all descended from a common, though extremely remote ancestor.

What is called the fruit of the strawberry (the real fruit is the seed, of which the pulp is but the receptacle) bears an odd analogy to the "hip," or rose-apple. It is simply a rose-apple, which, in the long, slow process of differentiation nature for some purpose—and she does nothing without purpose—turned wrong side out, placing the seed on the outside of the pulp instead of inside, as is the case with all other fruit of this order, except the blackberrp, dewberry and raspberry—close kindred of the strawberry.

CHAPTER II.

DIFFERENT SPECIES OF THE STRAWBERRY.

After much disputation and no little confusion, botanists have agreed in dividing the strawberry family into seven more or less distinct species.

FRAGARIA VESCA.—This, the common, wild strawberry of England, is found in the cooler and more mountainous parts of Europe, North America, and probably under similar conditions in Asia and elsewhere. This variety has the distinction of not only having been the first species brought into cultivation, but also of being almost surely the oldest member of the strawberry family.

This is proven partly by its being more widely dispersed over the face of the earth than any other species, but mainly by the fact that its habits of growth and propagation are nearest to what the strawberry plant must originally have been.

Thus the universal fondness of the strawberry plant for coolness and moisture, and its intolerance of heat and drought, prove that the family *Fragaria* must have originated in a climate merging from temperate into cold. It is in regions with just that climate that we find *vesca*.

Again, the strawberry must originally have propagated almost, if not quite entirely, by seeds, just as most of the congeners of the great natural order *Rosaceæ* still do. Now *vesca* is vastly more dependent on the seed for perpetuation than any other species. In fact, there are varieties of this species, like the Monthly Alpine, which produce practically no runners at all, but are dependent on seed propagation or division of the original plant, the latter being evidently only one of nature's makeshifts; for plant subdivision could have been

of little or no aid in disseminating the species over the world, or even in enabling it to move to a near-by or more favorable habitat when the present one becomes unfavorable. It could only have kept it alive in one place till it was overwhelmed or crowded out by vegetation of more rampant growth.

But the strongest proof of all of *vesca's* ancientness and nearness to the original type is the fact that of all species it varies less in propagation by seed. In fact there are varieties of this species, like the Alpine, which are more successfully propagated from seed than in any other way. Thus the Alpines and their kindred may be honored, if for nothing else, as the most ancient and aristocratic member of the *Fragaria* family. Like aristocrats generally, they are exceedingly averse to blood intermixture outside of their own caste. I believe that the Alpines utterly refuse to hybridize with other species. At any rate hybridization is more difficult, and I believe that none have ever been made.

FRAGARIA CALIFORNICA.—This is a small-fruited species found only in California and Northern Mexico, and very nearly allied to the former species, *F. vesca*. If any varieties of this species are in cultivation, it is a very recent thing.

FRAGARIA INDICA.—This is a yellow flowered species found wild in Upper India. The berries are small, red and insipid, and the specie is grown generally as a curiosity.

FRAGARIA ELATOIR.—This species is indigenous to Europe and is found most plentifully in Germany. It is called *Hautbois* (oboe), meaning Highwood. Possibly it is so named for the reason that it grows in woods, when nearly all other members of the family do not. But the name most probably comes from the habit of bearing its fruit

on long stems elevated above the foliage. The berries are brownish, pale red, and sometimes greenish when full ripe. The flavor is musky and disagreeable to most. It has never been cultivated to any great extent. Of all the *Fragaria* family it is most inclined to be dicœcious, to separate the sexes on different plants. This is probably an indication of plebianism or of a short ancestral line, widely differentiated from the ancient type, which produced male and female organs in the same blossom. In calling dicœciousness a mark of plebianism, it must be remembered that I am speaking from the standpoint of scientific interest, not that of utility. For the tendency to dicœcism has been rapidly developed in two species by the high culture and coddling lately bestowed on the strawberry for commercial purposes.

FRAGARIA CHILIENSIS.—This species is found on the west coast of America from Alaska to Chili. As many of its varieties bear very large blossoms, they were formerly classed as a species, and called *Grandiflora*. The most famous varieties cultivated in Europe belong to this species, or were obtained by crossing it on varieties of other species, notably by crossing on varieties of *F. Virginiana*. *Chiliensis* as a variety is noted for its large size and mild flavor. It seems to succeed better in Europe than any of the other American species.

FRAGARIA VIRGINIANA.—This is the common wild strawberry of the United States east of the Rocky Mountains. From this source comes the sprightliness of flavor and beauty of coloring that have captured the eye of the world and its stomach. This species has received more attention for propagation than probably all others combined. Varieties innumerable have been produced by crossing

its varieties upon each other aud upon varieties of *Chiliensis*.

The Wilson is the most typical variety of *F. Virginiana*. Charles Downing and closely allied varieties, Mr. Fuller classifies under a sub-species, ILLINOENSIS, which is probably too close to *F. Virginiana* to be even partially severed from it. It seems to be simply *F. Virginiana*, which has developed a coarser habit of plant growth under western conditions of soil and climate, just as has been the case with tobacco. It is naturally larger than the typical *F. Virginiana* and of lighter color.

CHAPTER III.

THE NAME AND HISTORY OF THE STRAWBERRY.

From the Latin name of the strawberry, *Fraga*, have come the Spanish *Freza*, and the Italian *Planta di Fragola*. The Germans call it *Erdbeerpflange*, Dutch *Aadbezie*. The Spaniards of South America give it the musical and appropriate name *Frutila*, *Little Fruit*, though the name would hardly fit some of our huge new varieties, three inches or more in diameter. The French name is *Frazier*, from a Frenchman who introduced the Chilean variety in France.

The origin of the English name of this berry is more uncertain than that of almost any other fruit. Some philologists derive its name from the habit of its runners to stray or wander about—*strae*, the old Saxon form of stray, being sometimes corrupted into straw. Some trace the name to the practice of children to string the soft, easily penetrated fruit on straws. Others think that the straw used to keep the berries clean gave the strawberry its

name. The resemblance of the thick and interlaced runners, especially in a dead, dry state, to straw, has to others suggested the origin of the term.

I think it very likely that the name came from none of these sources. It is almost certain that the name did not come from the straw used to mulch the fruit; for a wild fruit as conspicuous and popular as the delicious wild strawberry of England would hardly have been nameless till the fifteenth century, when it seems to have been first transplanted into English gardens, while the use of straw or of any mulch was almost sure to have been later still.

While it is possible that the name may have come from the above-mentioned practice of children, and probable that it came from the resemblance in spring, when the ripe berry attracted attention of the dead runners to straw, there are stronger reasons for a different origin of the word.

It is not probable that our rustic forefathers (and it is likely that the name strawberry was brought with them from the continent, where the berry abounded, and is much older than their presence in Britain), were observant enough of the habits of the wild strawberry plant to derive a name from its habits of strawing, or as we would term it, straying. Especially when there was an appellation so much more obvious and, to them more easily distinctive.

Primitive man, like the child, is apt to give names expressive of some characteristic prominent at the first glance. Nice distinctions are beyond him. Now, as a child, it never occurred to me that a strawberry—and this region has always been famous for the excellence of its wild strawberries—could have its name for other reason than that I found it

growing wild amid the straw of the old fields. This seems to be its habitat in all countries, partly because the straw presents a grateful winter protection for the strawberry plant, but mainly because in open unshaded spots both straw and the strawberries find the most genial conditions and flourish there the best.

I will add that the word straw, meaning the stalks of certain grains, and also, it seems, very early applied to certain wild grass when in a dry state they resemble the stalk of grain, is so old a term that it is found not only in the earliest Anglo-Saxon, but also in the languages derived from the same ancient stem.

Although there is no record of the strawberry having been cultivated till the fifteenth century, it is hardly probable that no Roman gardener, eager to please the eye and palate of his luxurious master, no monk, skilled in the garden-craft of the middle ages, as the denizens of the monasteries were—it is hardly probable that some of these, alert and industrious as they were, failed to reduce the wild strawberry to cultivation and improve the size and quality, as they did most other things within their reach.

But it is pretty certain that the strawberry was not cultivated to any considerable extent till a short while before the discovery of America. For a long while then, and even down to the close of the last century, there seems to have been only a very few different varieties in cultivation. Yet if there had by chance been many more, they could hardly have been distinguished; for a writer of Queen Elizabeth's time speaks of three varieties in cultivation, and distinguished them by their color, white, red and green fruited.

We have the satisfaction of knowing that it was

the introduction of the American varieties, descendants of *Fragaria Virginiana*, our common wild strawberries, that gave the great impetus to strawberry culture in England and thence to Europe. But up to 1834 the crossing and improvement was done in England, and the new varities sent back to us. In that year the introduction of the Hovey, a variety of American origin, led gradually but slowly to the propagation and planting of American varieties almost exclusively, as is now the case.

In strawberry growing, as in many other things, we have, so far as quantity is concerned, far outstripped the old world. While I have no exact statistics, the yearly acreage and production of strawberries in the United States is enormous in its proportions. The total strawberry product offered on the markets of the United States has recently been estimated at $100,000,000 annually. Prodigious sums have been made to the acre on this fruit. While slovenliness boosted by luck will have less showing than in the days when the acreage was smaller and the modes of culture cruder, the demand for good berries is steadily increasing. Diligence and intelligence will not fail of its reward.

CHAPTER IV.

SEX OF THE STRAWBERRY.

All plant life, and indeed all animal life as well, was originally monœcious, that is, they had both sexes united in the same individual. Animal life, except in its very lowest forms, is now at an immense remove from this state of monœcism. For dioecism, the separation of the sexes in two different individuals, is the chief mark of development,

or the rising from a lower to a higher form of life.

Dioecism in plant life must be, comparatively speaking, a very recent thing. Reasoning from analogy it seems to be an unmistakable mark of development in the families and species of plants, notably the strawberry, in which it has appeared; not necessarily an improvement in the fruit, often quite the contrary, as is the case with the Hautbois, but a development of modes of life and propagation, which nature found to be most effective to perpetuate the species.

This separation of the sexual organs in the blossom of different plants has appeared in a very marked degree in two species of strawberries—*Fragaria Virginiana*, our common wild strawberry, and *Fragaria elatoir*, the Hautbois or Highwood strawberry of Europe. Among the latter dioecism is common even in its wild state. Our wild strawberry seems not to have developed this quality to much extent till cultivated and caused to lead a highly artificial mode of life.

As none of the varieties in general cultivation are descended from the Hautbois, the tendency to dioecism now so common must come from *F. Virginiana*, our common wild strawberry. This species crosses readily on the Chilean species, but obstinately refuses to cross on all, or nearly all varieties of the other species.

Dioecism in the strawberry as in all fruits manifests itself in the blossom—the blossom of one variety being female, or, as they are usually termed, pistillate or imperfect, while the blossom of another contain both male and female organs and are termed staminate, or perfect.

Pistil means, pestle, and pistillate varieties are so named because each of the compact clusters of seed-bearing organs in the centre of the blossom

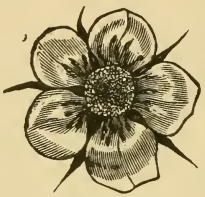
resembles a pestle when closely examined. Every one of the pestles or pistils bears at the base a rudimentary seed which develops into a real seed when its pistil is impregnated with pollen. This pollen, which is the male principle, is an impalpable dust, invisible to the naked eye. Each respective pistil must be impregnated by it. If not no seed form at the base of that pistil. And if no seed develops then no pulp or fruit, which is simply a receptacle for the seed forms. If all the pistils are pollenized or impregnated then every seed develops with its surrounding portion of pulp and the result is a perfect berry. If from lack of pollen or impregnating dust only a part of the seed develops, the result must perforce be a knotty, imperfect berry. For frugal nature wastes nothing. She never develops pulp or fruit except to nourish a seed.

Staminate or perfect varieties are so called from the stamens (meaning threads) which are the organs that bear the pollen or impregnating dust. Many pistillate varieties are, in varying degree, staminate; that is, they have more or less stamens and are able to partially pollenize their own pistils, especially in favorable seasons. Practically all staminates are double sexed, that is, the blossom contains both stamens and pistils, and are thus enabled to impregnate themselves as well as pistillate blossoms growing near enough to be reached by their pollen, which nature sends abroad on every breeze as well as on bees and insects passing from flower to flower.

There have been known staminate varieties which could not pollenize themselves, although their pollen was perfectly potent on pistillate varieties growing near. But such varieties are exceptionally rare and need not be taken into account. There are also a few staminate varieties, like the old

Crystal City, in which the pistillate or female principle is so weak that not one bloom in ten makes a berry. Their imperfect pistillization was plainly to be seen on examining the bloom.

A short study of the following cuts will enable anyone to distinguish staminate and pistillate varieties.



STAMINATE.

PISTILLATE.

When pistillate varieties are planted care must be taken to see that they are thoroughly pollenized. This can be insured by planting every fourth row of the field in a staminate variety whose blooms are rich in potent pollen. The staminate variety must also correspond in time of blooming with the pistillate variety it is intended to pollenize. Thus early blooming staminates should be planted with early blooming pistillates, medium with medium, late with late.

It is now a generally conceded fact that the berries of a pistillate variety are to a considerable extent affected by the character of the staminate variety by which they were pollenized. This influence of the pollen extends in varying measure to the size, color, flavor and firmness of the pistillate berry, thus making it all the more important that the staminate used to pollenize any given pistillate should be the nearest fitted for the purpose that intelligence and experience can furnish.

In our catalogue (The Continental Plant Com-

pany, Kittrell, N. C.) the staminate and pistillate varieties are always distinguished, and you are told exactly what stiminate to plant with each and every pistillate. No other nurseryman takes as much pains in this subject. We know its supreme importance and give it corresponding attention.

ARE STAMINATE OR PISTILLATE VARIETIES BEST?

This is a query as old and as hard of an answer as "Who struck Billy Patterson." Much argument and no little temper has been wasted on both sides and agreement seems now farther off than ever.

The advocates of staminate varieties argue that heavy and continuous rains occurring in blooming time wash out the pollen and prevent it from getting abroad. They also contend that very high winds blow it swiftly aloft and far away from pistillate blooms no matter how near. It is also pointed out that on extremely rainy or windy days no bee or insect ventures abroad to suck blooms and carry pollen from one to the other. The trouble in keeping the runners of the two varieties separate is also dwelt on.

None of these arguments are without force, although exceedingly unfavorable weather, such as heavy and incesant rain, may prevent even staminate blooms from pollenizing themselves. But of course they are not as liable as pistillate to fail of pollenization.

It seems never to have occurred to anyone that this controversy, like so many that distract the world, does not admit of final decision. What growers, or what at least, progressive growers seek are varieties that pay the largest and surest net profit? Now in certain periods of time and certain localities these most profitable varieties may be staminates, and again in other periods and in other localities they may be pistillates.

Thus both in the sixties and the seventies it was clearly demonstrated that the Wilson Albany, a staminate, paid best. But a man, who during the eighties had stuck to the Wilson because it was a staminate, and refused to plant Cresent because it was a pistillate would have paid a pretty dear price for his obstinacy. For Cresent was then quite twice as prolifc as Wilson and was generally the best paying of all varieties. Since then the pendulem of profit, while not oscillating quite so far either way, has swung first to staminate then pistillate, as the merit of staminate and then of pistillate varieties were made manifest.

The wise man ties to neither one or the other. He plants the variety, be it pistillate or staminate, which his own experience, or the experience of competent and reliable men, prove to be the best for his special need—the variety in which, for him, there are the most clear dollars.

CHAPTER V.

PROPAGATING STRAWBERRY PLANTS.

PROPAGATION FROM SEED.

There is little doubt that the strawberry plant originally propagated from the seed, for the oldest and most widely dispersed species still increase that way.

Runner-propagation seems to have been a habit gradually acquired by such members of the family *Fragaria* as were, by various natural causes, removed from the comparatively bare mountain or hill-sides to the moist and weed-infested soil of lower, warmer regions.

In such an environment a feeble, slow-growing plant like the strawberry seed produces would have

had a small chance in the struggle for existence. But nature is watchful of her children. Seeing that her lowly nursling was about to be crowded out of existence by her stouter and more robust offsprings she endowed the feebler one with a new mode of propagation. The quick-growing, quick-rooting runner was the result.

Some varieties, like the Monthly Alpine, plant growers still propagate more successfully from seed than otherwise.

But nearly all propagation from seed is now done to start new varieties.

Owing partly to a tendency already developing when the strawberry was first reduced to cultivation but mainly to the extensive crossing and re-crossing of varieties by modern nurserymen, strawberry plants grown from seed vary widely from their parent or parents and from each other.

This variation is takan advantage of to originate new varieties, differing from each other widely in size, color, firmness, productiveness, flavor, time of ripening, etc.

HOW TO GROW PLANTS FROM SEED.

Select large, fine, perfectly developed, and perfectly ripe berries of the variety you like best. If a cross of any two given varieties is desired, pistillate and staminate, select the berries of the pistillate growing with and pollenized by the desired staminate. Let no other than the desired staminate be grown within 300 feet.

No little of the success of the seedling seems to depend upon the seed having been selected from fruit grown a good berry year—a year in which strawberries are generally large and prolific. Therefore plant no seed grown a bad berry year.

The berries selected, crush and rub the pulp in fine, dry sand or earth till the seed are separated

and thoroughly mingled with the dry sand or earth, and keep dry to the following spring. Then sow these seed, sand and all, in rich, finely pulverized soil. Cover about one fourth of an inch deep with fine earth. Protect from beating rains. It is better to water exclusively by hand till the seed comes up, applying the water by some gentle means to prevent packing the soil. Keep the soil moist at all times.

The young plants will appear in two or four weeks. Before they begin to crowd each other too much in the box or bed, transplant them in rich soil, setting the plants six inches apart in rows, the rows about two feet apart. Cultivate well during the summer and fall. Also cut off all runners as fast as they appear, so that the plants may make a vigorous growth.

The following spring they will probably bear, not a full crop, but enough to give some indication of their value or worthlessness. Often it is the second spring before any fruit of consequence is borne. Preserve the most promising plants for further tests, and destroy the others.

Continue the above cultivation and runner-cutting for one more summer. The next spring you ought to be able to make a final decision.

From the plants thus finally selected, runners can be allowed to grow on the third summer and young plants raised at will.

But be not sanguine overmuch. Big prizes are scarce in this lottery as in all others. But thus, and only thus, does true progress come.

PROPAGATION BY RUNNERS.

Nature still propagates largely by means of seed, the result, owing to the similarity of varieties growing near enough to each other for natural crossing, being a pretty close adherence to the type. But

man propagates almost entirely by means of runners. His propagation from seed is almost wholly for the purpose of originating new varieties; for the number of Monthly Alpines and their congeners grown from seed are but few.

Runners begin to grow about blooming time and continue to form and take root in wet weather till frost. Plants obtained this way remain practically true to the type. Nor can two varieties thus mix except by an intermingling of the runners and the digging of them up together. A field set with such plants will, of course, have growing in it plants of the two or more varieties allowed to intermingle.

Practically the only change that takes place in plants grown from runners is a slow, gradual and almost inevitable deterioration of running out of varieties. By intelligent and persistent selection of the best plants to raise runners from this tendency may be checked and even reversed, resulting in improvement rather than deterioration. This breeding up is deemed so important to the highest success in strawberry-growing that a chapter will be devoted to the system long followed by myself and now continued on a larger scale by the Continental Plant Company, of which I am President and General Manager.

CHAPTER VI.

THE STRAWBERRY AS AN ARTICLE OF DIET.

The great healthfulness of the strawberry cannot be doubted by those who are fortunate enough to be able to eat the really luscious varieties in their fresh and thoroughly ripened state. He who judges the strawberry only by what he buys and eats in open market has but a slanderous notion of that Queen of Fruits. Market varieties are not only

necessarily gathered more or less unripe, so that they may be firm enough to stand transportation, but they are rarely or never the best eating varieties. The market grower and shipper of berries studies every other quality in the variety he selects to grow except the fitness to eat. It must be productive, large, firm, highly colored. But whether it is sweet as a sugar-plum or sour enough to make a razorback pig squeal concerns him not; in fact they are almost sure to be sour, for the reason that firm varieties are nearly always sour varieties.

As far removed as nectar from garbroth are the perfectly ripened, home-grown berries from the average offerings of the market. I would not be understood to thus depreciate all berries offered for sale. There are gardeners who raise and sell berries of which no man can rightly complain. Such should be liberally patronized, but they are scarcely more than the exceptions which prove the rule.

If the strawberry is to be enjoyed in its supreme perfection, care must be exercised in the selection of varieties. Nor will the same varieties please all palates. But the great majority of people like a sweet berry; not one of flat and insipid taste. These are not sweet, but tasteless.

But what is wanted is as much sweetness as possible to balance the natural racy acidity of the fruit. This has been attained in several of the best table varieties. I will not here name the varieties, for the reason that improvement in table varieties is now going on. The variety that is in this respect the best now, will almost surely not be the best a few years to come. Our semi-annual catalogue will enable one to select the best and most reliable varieties for home use or for market; or we shall be glad to give by letter any advice needed.

The right variety selected and grown, there is

another important point to be observed. The berry must be allowed to get *ripe*. Many varieties, and some of the best, get red along time before they get ripe, In fact, redness often preceeds by nearly a week the state of perfect ripeness. This is indicated usually by the redness becoming blackish.

Then it is that the strawberry becomes both food and medicine to the system overtaxed by the gross winter diet. It will not disagree with the most delicate stomach, especially if eaten without sugar. In fact, nothing spoils the perfect berry more than an excess of sugar.

People find strawberries to disagree with them either because they are eaten while unripe, adding an excess of sugar to take the place of the sweetness which nature would have given a little later, or because the variety eaten is of a nature too sour to be perfectly wholesome at any stage.

The strawberry, ripening as it does as the forerunner and herald of all other fruits, rightly occupies a place of its own in the estimation of man, and here men embraces women and children, if he ever does. Whether it is that the strawberry is superior to all other fruits, or whether it is that the then imperative need of fruit makes us think so, it matters not. One thing is certain, its color, fragrance and aroma appeal to more senses, or appeal to them more strongly than later fruits can.

It must be that nature, ever beneficient and seeking our good in spite of ourselves, makes it most enticing because we need it most. The palate craves its sprightly acidity because the liver needs its gentle action. It is one of nature's boons, which she bestows to make amends for months of winter niggardliness—one of her sovereign remedies given to fit us to weather her approaching summer heats.

A good strawberry bed or strawberry patch is a

thing of beauty and joy forever. Not even the watermelon patch or the cider-press can ever quite usurp its place in the boyish memory. They, coming later in a more plenteous season, have rivale in his heart. The strawberry has none.

The helpfulness of the strawberry bed to the hard-run housewife, at her wit's end to cater to squeamish appetites amid the dreaded scarcity of spring, will not be questioned by one who ever enjoyed its benefits.

The ways in which the fruit can be served are simply innumerable. A chapter in this Treatise will be devoted to that subject.

CHAPTER VII.

THE BEST SOIL FOR THE STRAWBERRY—ITS WONDERFUL ADAPTIVENESS TO ALL SOILS AND CLIMATES.

No fruit, no plant or even weed, thrives over as vast a region of earth as the strawberry does. No continent or considerable body of land is without it in an indigenous form. Adapting itself to the environment, influenced by the conditions under which it exists, large or small, sweet or sour, brilliant or pale-colored, as nature vouchsafes or refuses the three great requisites, sunshine, moisture and fertility, it is nevertheless always unmistakably the strawberry and nothing else.

In the New World it is especially at home. From the frigid steeps of Alaska, down through the broad regions of the north temperate zone, under the equator—where it climbs the mountain sides for a genial habitat—along through the temperate regions of the other hemisphere till it meets the ice of the

far south, the wild strawberry extends in an almost unbroken chain.

Grown in every genial spot over this broad and endlessly varied expanse by the hand of unaided nature, man, by supplying fertility, water where needed, but chiefly sunshine or breathing room by keeping down the smothering weeds and grasses, can grow it virtually everywhere.

But to come to the practical point. What soil is best for the strawberry? I might almost say, the soil that is manured the best and cultivated the best.

I have never seen many acres of land on which, with reasonable care, the strawberry could not be successfully grown, and I have seen a great deal of mother earth. Of course it can be more easily and more successfully grown on some soils than others. But the soil in which it can be grown with the very highest success is very extensive indeed.

The ideal strawberry soil is a black, sandy loam. Black soils, absorbing heat readily, berries grown on them are, as a rule, earlier. Even in hilly regions more or less of black, flat land, can often be found. It is usually swampy and sometimes very difficult to drain and reduce to fine tilt for cultivation. But once put in proper condition it is extremely valuable for the crop in question.

In some regions there is one very strong objection to growing strawberries on such low places. That is, the danger from frost is much greater, especially when near small water courses—large bodies of water acts as protection from frost. But this danger is more than counterbalanced by the great productiveness of such soil of fine and early berries, especially as damage from frost can be prevented by a simple mode, to be given further on in this treatise.

It will not be amiss to repeat that such soils should not be planted in strawberries till thoroughly drained, cleaned of all roots and trash and cultivated for at least one year in corn or some other hoed crop.

Yet those who cannot get such soil—and the vast majority cannot—need by no means despair. The largest and most profitable crop that I ever grew in my twenty-five years' experience (11,000 quarts an acre) was grown on almost the opposite kind of soil—a field running rather to stiff, red clay. This result was obtained by intensive culture and manuring, directions for which will be given in due order. It goes to prove that after all more depends on the man than on the soil.

Water being the *sine qua non* (without which nothing) of the strawberry—fully ninety-five per cent. of the berry being water—it is all important that a moist, rather than a dry soil, be chosen. Still it must be one not given to sogginess, or, if such, it must be corrected by proper drainage.

Other things being even, a field sloping to the south will give the earliest berries. One sloping pretty steeply to the north, or northeast, will give the latest berries, especially if the growth of the plant is judiciously retarded in early spring by keeping them covered with mulch.

On land sloping to the south, or better still, to the southeast, and protected by woods, evergreen hedges or buildings on the north side will usually give exceedingly early berries—somes two weeks earlier than unprotected fields. But a ditch should be dug between the woods and the strawberries and kept open so as to prevent the trees from robbing the plants of moisture and fertility. I have known broad borders along strawberry fields drawn and killed by tree roots in dry time.

The prevailing opinion that sandy loam will always produce the earliest berries is not correct. I must qualify my statement that even a black, marshy loam will do so. Some varieties, notably the Bubach, ripen earlier on rather stiff soil than on any other.

Safe advice to give an inexperienced grower, with only ordinary farm land to choose from, is to choose that on which the greatest variety of farm crops do the best. The nearer it approaches to what is considered good garden soil the better.

Although in some sections strawberries are grown with considerable success on freshly cleared land, and in other sections on sod land, it is always wisest to avoid such land if possible. Land for strawberries should always, when possible, have been cultivated at least one year preceding in some other crop. Potato land is usually an excellent tilt for strawberries.

Land not previously cultivated is almost sure to be infested by cut-worm, white grub and other harmful pests. It is also apt to be full of weed and grass seed, which will add greatly to the labor of cultivating the strawberry crop.

I will add that the general opinion that sandy loam is apt to be thirsty, and to suffer most from drought, is erroneous. As a rule, it suffers less than stiff land. Stiff soil, after every packing rain, is apt to bake and crack. But this can be largely prevented by timely stirring, which in summer should never be neglected.

All soils, and especially very stiff and very sandy soils, are vastly improved for strawberries by increasing the vegetable matter they contain. This can be done by turning under cowpea vines at the South and annual clover at the North. (The best varieties of cowpeas for rapidly improving land—

and nothing builds it up as fast and as surely—can always be bought at reasonable price of the Continental Plant Co., Kittrell, N. C.) Stable manure also has an excellent effect in this respect.

The presence of vegetable matter renders stiff soils more porous and penetrable by the plant roots in search of food and drink. It also renders both stiff and sandy soils far more retentive of moisture.

I have also grown magnificent berries on what looked almost like pure sand, by the addition of vegetable matter and the liberal use of fertilizers.

CHAPTER VIII.

MANURING STRAWBERRIES.

It has been pretty well established that on average soils the following is about the right proportion in which to apply the three great fertilizing properties:

Ammonia, 3 per cent.
Phosphoric acid, 7 per cent.
Potash, 9 per cent.

That is, that the analysis of 100 pounds of fertilizer should show the presence of three pounds ammonia, seven pounds of phosphoric acid and nine pounds potash, or in that proportion. While other properties are essential, they are required in exceedingly minute quantities, and are present in sufficient quantities in nearly all soils.

Ammonia is the principle which gives plant growth, greenness and vigor. On freshly cleared land, and wherever there is a large quantity of decaying vegetable matter, it is almost sure to be present in large quantities. It is the only property

which nature can herself return to soil depleted of it. True, she can in some small measure restore potash and phosphoric acid by means of plant roots, which go far down, appropriate it, bring it to the surface and leave it there on the death and decomposition of the plant. But this process is vastly slower than the one by which she restores ammonia to the soil.

Ammonia forming one of the properties of the air, it finds its way into the soil in three ways. Rain carries in some. The soil obtains some by direct absorption from the air, but only in exceedingly minute quantities, except, where brush, leaves, stones, or something else partially excludes the air and conserves moisture. In such cases the accumulation of ammonia is often considerable, as is proven by the richness of spots thus protected for some years. The chief resource for saltpetre (a form of ammonia) was once old cellers and other walled and protected places. Indeed thence comes its very name—saltpetre, rock salt—salt obtained from rocks and walls.

But the great source of ammonia is from decaying vegetable matter. The growing plant, besides the ammonia obtained from the soil, absorbs a good deal from the air, which, upon its decomposition, passes into the soil. Thus do weeds and grass fulfill their great part in the economy of nature.

Man, learning from the great teacher, Nature, sees that he can supply the soil with ammonia most cheaply by following the same method—that is, by turning under green crops. For this purpose he selects clover, cowpea vines and other members of the vetch family, as they derive their ammonia more largely from the air than do other plants. Of all these the cowpea, where it can be grown, is infinitely the best. Supplied with a little potash it will

grow on soils too poor to bring anything else; proving it to feed more largely than any other from the ammonia in the air. Nevertheless some ammonia adds greatly to the luxiousness of the pea-vines on poor soil. A little cotton seed meal helps wonderfully.

This is the main reason why turning under clover and peas is so beneficial. But the increase of vegetable matter is in itself highly beneficial. Its presence renders stiff soils lighter, and all soils, especially sandy ones, more retentive of moisture.

For the best results most soils will need more ammonia than can be supplied by turning under green crops. In most sections this can be obtained more cheaply from cotton-seed meal than anything else. Besides, cotton-seed meal being a vegetable manure is less apt to burn the roots of newly set plants than any other fertilizer. It should be applied broadcast, or in the drill and harrowed in. It should never be applied as a top dressing, its ammonia being volatile and liable to evaporate. Some find fiish scrap the cheapest source of ammonia. Like cotton-seed meal, it should never be applied as a top-dressing. Nitrate of soda should be used instead.

The phosphoric acid is obtained mostly from acid phophate (phosphate rock dissolved in sulphuric acid), ground bone, or dissolved bone, which, being quicker in its action, is better for strawberries than ground bone.

Potash is obtained from kainit, sulphate and muriate of potash. Hardwood ashes are also rich in potash, as are also tobacco stems. The growing of fine fruit largely depends on the liberal and judicious use of manure rich in potash.

Stable manure, as well as the dropping of all animals, and fowls, contains all three properties—

ammonia, phosphoric acid and potash—but not in the right proportions for most crops. For strawberries especially there is too much ammonia in proportion, and where largely used alone will result in finer plants than berries. Supplemented with hardwood ashes it is a perfect strawberry manure.

The manure should be broadcasted and plowed in before planting. In this way it can be applied in almost unlimited quantities if well rotted. It can also be applied around the plants and, in climates cold as this, over them the following late fall and winter. Ashes can also be applied the same way. But they pay better in the fall, winter or very early spring, before the plants come into main bearing. Fifty bushels to the acre, or even more, can be safely applied.

In winter, when the plants are in a dormant state, ashes or any kind of fertilizer can be sown over plants *when they are dry*. If wet with dew or rain, fertilizer is apt to burn the leaves. Never sow anything on plants while in a green or growing state—sow it around them. In the far South, where the strawberry grows all the winter, fertilizer must be sown around them.

An excellent mixture can be made for top dressing (sowing over or around strawberries) as follows per acre:

100 lbs. nitrate of soda.

100 lbs. sulphate of potash.

300 lbs. acid phosphate or dissolved bone.

Crush all lumps and mix well with hoes before applying.

Lacking cotton seed meal or plenty stable manure, the above mixture can be applied in the drill before planting, again over or around the plants the following fall, and again the same very early the next spring. The strawberry needs liberal feeding,

but it should be a little at the time. A great deal of manure can be safely applied if done at intervals of say four months.

Where very heavy manuring is to be given it should mostly be applied and thoroughly mixed with the soil before the plants are set. I have, with profit, thus turned in one ton cotton-seed meal, 1,000 pounds kainit or 300 pounds sulphate potash and 1,000 pounds acid phosphate per acre, and followed this the next winter, twelve months later, with a top dressing of 100 pounds nitrate of soda, 300 pounds acid phosphate and 100 pounds sulphate of potash.

Where it is not practical to obtain the above ingredients, very good results can be had by using some reliable commercial fertilizer rich in potash. Never forget that an excess of ammonia will make plant growth at the expense of berries, and if applied too heavily within say six months preceding the ripening period, will tend to make the berries soft. Growers who have to ship a long way will need to be more careful on this point than those who are nearer market. Therefore, growers in the far South who plant in fall for a crop the next spring, cannot use as much ammonia as growers elsewhere who plant in winter or spring for a crop a year or more later. It is more important that the grower in the far South should plant on soil already fairly rich in ammonia. The potash and phosphoric acid can be applied as directed in foregoing pages.

The best soil for strawberries is that which has been heavily manured for some preceding crop, like potatoes or truck of some kind. Whenever practicable use that kind. Still very poor soils can be manured to make splendid crops of berries.

CHAPTER IX.

TERRACING AN IMPORTANT PART OF STRAWBERRY CULTURE.

The strawberry grower should be an intensive manurer. His soil should be rich. If hilly, or even rolling, it will wash. When rains wash away such soil as that, it is washing away money from him and his forever.

Prevent it by terracing. It is simple and effective. Even as a conserver of moisture it is of the highest value. There should be a terrace for every three feet of fall on the hill-side. That is each terrace should be three feet lower (perpendicular) than the terrace above it. This three feet perpendicular will put the terraces far apart or close together, as the field slopes gently or very steeply.

SLOPING TERRACES.

Procure or make of light strips an A-shaped level, such as is used in getting the "fall" in ditching. Let the span be twelve feet and set it so as to allow and half inch fall in the twelve feet. Any ditcher will know what this means.

Plow the land, leaving it as smooth as possible.

Walk over the field and use your very best judgment as to the best direction for the water to be carried off, and also select the places where you think the terrace should begin. Put down your level three feet below the highest point and go where it leads you, allowing the half inch fall to the twelve feet span. A small stake, or a mark with a hoe, should be made at the foot of the A-shaped level as you go. This is to guide the plow in running off the terrace.

The field thus marked off in terraces with a three

feet drop between each, take a two-horse plow and throw up as high a bed as possible, so that the line marked off will form the ridge or higher part of the bed. The bed should be about eight feet wide.

As soon as rain "firms" the soil, so that the plow can turn it well, go over it again with the plow and throw up the beds still higher.

If it is not convenient to wait for rain to "firm" the soil, broad hoes can follow the plow and draw up the beds to a sloping crest or ridge along the line marked off by the level. A one-horse plow, followed by hoes, will answer; when hoes are used one plowing with either plow will do.

The field, all properly terraced, will consist of a series of high beds about eight feet wide, with a well defined depression (but not a ditch) above each bed or terrace. These depressions are to carry off the water. Be sure to have this bed strong enough to stand. It should be fully fifteen inches high after it settles, sloping gently each way.

Now run your rows for strawberries so that they will run into and shed the water into this depression up-hill, as it were, or in an opposite direction from that in which the water runs. These rows should have just enough fall towards the terrace to allow the water to run very slowly into this depression above the terraces.

Let your strawberry rows or beds run on across the depression and the crest of the terrace just as if they did not exist, only it will be best to lift the plow a little just at the crest so as not to break it down.

The rows have to wind in comformity with the slope of the field and so as to enter the depressions between the terraces up-hill, but not an inch of space need be lost on account of them. The plants

are set the usual distance apart from one end of the row to the other.

Thus terraced, the rains and the floods will beat on that field in vain. In fact rain, instead of washing, improves it. The water follows the rows till it enters the depression between the terraces. As it enters up-hill, or in an opposite direction to that in which the water is flowing, it checks its already slow and gradual running off.

The water flows off along this depression by gradually finding its way over the strawberry rows which cross it, just as if no terrace or depression existed.

The water pours off so slowly that an enormous proportion of the rain-fall soaks into the soil for the future use of the plants. It never gets headway enough to do much washing.

The terraces can be maintained forever without cost by always breaking up the land so as to throw the beds or terraces up higher every time.

LEVEL TERRACES.

For many years we followed the sloping terrace system and most of our land is still so protected. During the past few years we have adopted the level system. This, while somewhat more expensive and calling for more care in running off the terraces, we find far better, especially for strawberries. Strawberries are, or should be, grown on very low beds or ridges. Being low they do not control the rain water like higher corn or cotton beds, but allow it to flow over them, collect in a body and do harm before the water is arrested by the terrace.

Level terracing when completed prevents washing almost absolutely. The terraces are run off at intervals of three feet fall between each as in sloping terraces. But the terraces have no fall, being

as nearly perfectly level from one end to the other as possible.

They can be run off with the same A-shaped level, adjusted to run level instead of gently sloping lines. But it is better to use a more reliable telescope level which can be bought of different qualities and degrees of accuracy from $5 up. We use a most excellent one made by Messrs Gurley, Troy, N. Y.

With this we run off, beginning three feet from the top of the hill or slope, level lines as far as it is desired to extend the terraces. These lines are each three feet in the perpendicular below the one above. The lines as run are marked with low stakes. On these lines the terraces are made.

All subsequent plowing is done by a hill-side plow. This plow has a swivel wing which at the end of each furrow is turned over to throw the dirt down hill. The first furrow is run just above the line of a terrace throwing the dirt down hill to form this terrace. This is continued by furrows run each above the other, changing the swivel wing to the plow to throw the dirt down hill every time.

This is continued till the next terrace line above is reached. Then leave unplowed a space say two feet broad, move up above that terrace and plow likewise, throwing the dirt down to that till the next terrace line is reached and so on. As soon as rain settles the earth so that it will turn well repeat the plowing just as at first and so continue between each rain till the crest or lower border of each terrace gets fully eighteen inches high.

The aim is, by constantly throwing the dirt down hill, to finally reduce the strip of land between each terrace to an absolute level. This is attained by converting the hill-side into gigantic stair-steps. This is true terracing. It will take many plowings to complete this system, and its gradual carrying out

should cover at least five years plowing. This gives time for the clay subsoil exposed on the upper border of each strip of land, by the constant shifting of the soil down hill, to be improved and made fit to produce.

Our plan is to run off the terrace lines; give one plowing with a large two horse swivel plow, and then draw up with hoes a strong bank four feet broad and two feet high. It will usually take two plowings and drawings with hoes to get this bank two feet. Even then it will be found not too large. Drawing up this bank entails a good deal of labor, but it ends the job forever as far as special work or the terrace is concerned. After that the one or two annual plowings with the swivel plow, throwing the dirt each time down to this bank will gradually level each strip of land by raising the lower edge and lowering the upper one. In fact the final result to use a Hibernecism will be to make the lower side of each strip higher than the upper side.

The rows in this system do not cross the terraces as in the falling terrace system. Instead, the rows are run level like the terraces.

To the inexperienced terracing may seem a world of unnecessary trouble. They forget or probably do not know that every gallon of rain water that runs down a hill-side carries off fertility, never to return. The damage from washing to soil in the United States would, could it be computed, amounts to a stupendous sum annually—probably $100,000,000. That is if all fertility leacked out and conveyed off by rains was valued at the regular commercial rates. It has been estimated that a rich soil one foot deep contains the astonishing total of $2,800 worth of fertilizing properties per acre at market rates. Of course very little soil in this country is that rich. But average

good soil must contain several hundred dollars worth of fertility per acre, every ingredient considered.

Level terracing when completed virtually stops all loss of fertility from rain washing. Within a few years each strip of the terrace becomes a level plot or strip of land. Much of the rain water that falls soaks in, leaving some of the ammonia it absorbs from the atmosphere, and rendering the soil far less likely to suffer from drought. Any excess of rain that fell would find its way slowly downward in a thin sheet over the rows of plants, or what ever crop was grown, and over the terraces, doing the minimum of harm.

We always leave uncultivated a strip about three feet wide on the lower edge or crest of each terrace. Grass, but not high weeds, are allowed to grow on this crest to strengthen it and prevent the rains from washing it down.

The only drawback to this system of terracing is first, that the terrace must be run off level to stand. If not level the water will collect in the lowest place and break the terrace. Second, the terraces must at the start be drawn up broad and strong as a break anywhere turns loose a damaging flood of water. Third, until several years of plowing levels the strip, pools of rain water are apt to collect in the depression just above each terrace, bank and in very wet seasons may "drown" several of the nearest rows of plants.

Nevertheless, this system *properly carried out*, has merits that overweighs the drawbacks a hundred to one.

CHAPTER X.

NEW VARIETIES.

For the average grower to test all the myriads of new varieties that, with long strings of adjectives describing their virtues, are thrown on the market, would be impossible. To plant none of these because they are new, but to stick to the old because they are old, would be folly.

The ease and quickness with which new varieties of strawberries can be originated has led to their propagation without number. The facilty of propagation has, on the whole, resulted in good.

The great variability of most crosses, arising from the diverse ancestry of nearly all the varieties used for this purpose, has been employed in some instances greatly to improve the strawberry. Only by the strivings of many and the survival of the fittest can progress come here as in all other things.

If the strawberry offerings on the great markets of the country do not average a great deal better than they did ten years ago—and I have not seen it disputed that they do average better—it would have to be attributed to the fact that so many more berries were grown that the same attention was not bestowed on them, quart for quart, as was formerly done. I am sure that the berries grown on our farms average twice as large as they did fifteen years ago. Higher culture and manuring has had much to do with the improvement, but better varieties has had still more to do with it. In fact, we could not now sell at a profit such berries as we then grew. As far as my experience goes, the men who have found the strawberry business unprofitable are those who stuck obstinately to old varieties and the old methods of culture, packing, etc.

The progressive grower—and there is now no room for any other—while planting the bulk of his crop in the kinds of established merit, will at the same time not fail to plant, though less largely, of the new sorts.

A beginner, or one who, seeing the folly of an adherence to old varieties, wishes to plant something better must necessarily depend more or less upon the experience of others. A good rule, in selecting a variety that you do not know, is to take, not the one that is praised the highest by any one nurseryman, be he ever so reliable, but the variety that does the best in the widest region or the whole country, for a variety may be a prodigy in one place, and of much less merit nearly everywhere else. Then I have noticed that the kinds that do well everywhere are least apt of all to deteriorate. They have a vitality and staying power, and their virtues are sturdy and slow to wane.

I have sedulously avoided recommending any special variety or varieties in this treatise. I have not done it for the reason that the best varieties now will probably not remain the best up to the time when I shall have opportunity to revise the treatise. Improvement in modes of culture and nanuring are slow ; improvement in varieties, while less uniform, is more rapid.

Another vital point in selecting a variety is to get the one best suited to your special needs. In some cases this may not be neither the largest, finest nor most productive berry. Nor may it be one possessing all these qualities combined.

If you are a long way from market, firmness, carrying quality, has to be given the precedence over all other qualities. Ten thousand quarts to the acre will give little profit, and may entail actual loss, if they get to market a mere mass of wilted

pulp. Fifteen hundred quarts per acre of medium size glossy, highly-colored berries, carrying from the far South and arriving in the Northern markets firm and fresh very early in the season, will net a great deal of money.

Still the vast improvement in transportation, and especially in refrigerator cars, is rendering it practicable to carry safely much softer berries long distances than was the case a few years ago. The final result will probably be that the remote grower will be enabled to think much less of firmness and much more of the other desirable qualities.

By means of our semi-annual catalogue (September and January) growers can keep informed as to the relative merits of old and new varieties and their fitness for general and special purposes. We keep under test over a hundred varieties all the time—many being added and many discarded every year.

We never forget the fact that we are in the same boat with the growers, and must sink or swim as they sink or swim. Their success means the success of our nursery business. We spare no pains to discover the most profitable varieties for general or special purposes. Even if honesty did not impel us, self-interest would, to recommend to the growers the kinds that will pay them the best.

CHAPTER XI.

WHEN TO SET STRAWBERRY PLANTS.

Planting on a small scale can be done any time after the runners take root deep enough to form good plants—say after July 15th. But summer planting is almost sure to be a waste of labor and plants, unless pot-grown plants can be used. If

sufficient pains are used ordinary layer plants can be taken up by means of a garden trowel with a clod of earth adhering to the roots, and will answer nearly as well as if pot grown. The pot-grown plants are made by rooting the runners in earthen pots, sunk in the soil of the strawberry bed for that purpose. The plants are, of course, removed from the pots at planting time.

But even with such plants wet, cool weather must be chosen for planting during the summer months. Watering late in the evening and shading will be necessary should hot, dry weather come soon after planting. Summer planting requires more care and skill than the average grower is likely to bestow on it, and even with the utmost care and skill it is full of uncertainty.

The strawberry loves coolness and moisture and is intolerant to heat and drought. Therefore, the right time to transplant is when the weather is cool, or even cold, and the soil uniformly moist.

South of the latitude of Washington, D. C., planting can be done almost any day from September 15th to April 15th, unless it is too wet or too cool to work out of doors. Unless the soil should happen to be unusually dry for that season it will not then be necessary to wait for rain. With thorough wetting of the roots and fairly careful setting, it is hard, indeed, *not* to get a good stand. I have followed this plan for years and never fail to get a good stand. I have frequently planted in January and had the temperature to drop to zero within a week, and no harm result.

The only harm that extreme cold can do in this latitude would be on stiff, wet land, to heave the soil and lift the plants out. But I prevent this by stepping squarely and hard down on each plant set during the cold months on such soil. This

compacts the soil and lessens heaving in hard freezes.

The advantages of late fall and winter planting are manifold. It does not then conflict with other work. It can be carefully and properly done. If cold weather interferes for a few days and catches plants dug and not planted, they can be moistened and kept without harm till another favorable spell comes. A perfect stand is almost sure to result. The uncertain weather of spring finds the plant firmly rooted and growing. If the planting is not done later than March 15th the plants will get such a start as to be out of the way of the cut-worm when it gets warm enough for this deadly foe of the strawberry plant to begin his ravages.

A great deal of planting is done in September with more or less success. We find it safer to wait till October. But as the sun is then still strong, and drought more than apt to occur, much more care is necessary than with later planting, nor is the result near as sure.

While a good deal of planting is done at the North in the early fall, most of it is done in the spring, as early as out-door work is possible. But late fall and winter planting can be safely and surely done on light soils much farther north than is generally believed. In fact, plants may be set at any time, in any climate, and in any soil not at the time actually frozen, if at once properly protected. This can be done by covering the plants with straw, litter or coarse manure to a depth corresponding to the coldness of the climate. This should be deep enough greatly to lessen, but not to entirely prevent the freezing of the soil.

The covering must be gradually removed as growth begins in the spring. If stable manure is

used the plants will be both protected and enriched, and will grow off finely when spring opens.

A safe rule everywhere for spring planting is to plant as early as the conditions of weather will possibly admit of, and always to have the roots of the plant wet when it is set.

The advocates of spring planting maintain that even at the South it is better, because the opening of the growing season finds the plants set in freshly plowed ground, and that they have a better showing than if set so early that spring finds the soil no longer light and fresh. I admit that plants transplanted even as late as just before blooming time do nearly or quite as well as earlier planting, provided plenty of rain follows. But that is often not the case. Cold, dry, windy weather is as apt as any to occur.

This is just the weather for the cut-worm to get in his work, which some seasons and in some soils do much harm to tender, newly set plants. If this danger is escaped, and few plants die outright, more or less stunting is almost sure to be the result. The strawberry plant is slow to recover when thus stunted, and if a dry summer follows it never fully recovers. Nor have I ever once found spring-set plants to do better than those set in late fall and winter. Late fall, winter and very early spring planting allows time for replanting, though fields thus planted rarely need any replanting of consequence.

Now, I by no means assert that spring planting cannot be done with success. A large portion of the crop of the country is yearly planted at that time. What long experience has convinced me of is that South or North planting should be done as early in winter or spring as soil and climate renders possible, and that a great deal of planting is done

too late, to the great loss and worry of the growers.

The question is often asked me, can a crop of berries be gathered the following spring from fall set plants? Most decidedly yes, provided good, stout thrifty plants are set in good soil. On plants set in October and November we gather good crops of exceedingly large early berries. First-class plants set even after Christmas or as late as March will bear a good many surprisingly large berries, provided drought does not occur. The danger in allowing plants set after Christmas to bear the following spring is that being as yet but feebly rooted and fruit bearing being an exhausting process, drought will stunt and may kill some of the plants. We make it a rule not to allow plants set after Christmas to bear, pinching off the blooms as fast as they come.

But this applies only to field culture, where berries are grown on a large scale. Small garden plants can be watered and saved from drought. Water liberally late in the day and never while the hot sun is shinning.

It is the second spring after planting that either fall or winter set plants will bear the heaviest crop.

The above does not apply to plants set in Florida or the far South, which bear a full crop the next spring after setting.

CHAPTER XII.

FIELD CULTURE OF THE STRAWBERRY.

PREPARATION.

Directions as to choice of soils will be found under that heading.

The ideal preparation for strawberries would be

for the field to have been in crimson (annual) clover the previous winter—the clover stubble, or better still, the whole crop to have been turned under in May and the land put in cowpeas. The peas should be sown in drills, so as to admit of cultivation with plow. The pea vines should be turned under early in September Half a ton of agricultural lime to the acre, sown broadcast as soon as the pea vines are turned under will pay on most soils.

Of course few can make this ideal preparation, and it is by no means essential; but usually strawberry planting can be preceded by the clover or the peas.

Whichever it is preceded by, or if preceded by neither, it is important that the soil should have been cultivated the summer previous. Some plant in the spring after cutting off or turning under a crop of crimson clover. The only objection to this is that it necessitates late spring planting, which is never safe, owing to the danger of drought.

The field should be thoroughly plowed, and, if cloddy, well harrowed. We use a disc harrow, which reduces the roughest, trashiest soil to a fine tilth. If the subsoil is close and impervious to water, subsoiling will in many sections pay. Very good subsoiling can be done by plowing deeply with a medium sized wing, and having another plow, without a wing, but with a sharp point, to follow in the same furrow; a coulter or bull-tongue plow to follow the first plow is still better.

Plow the field twice this way, the second time diagonally across the first plowing.

If the land is hilly, or given to washing, terracing will pay many times its cost. Full directions for it is given under that heading.

If stable manure is to be used (and no manure is

better, the only objection being the troublesome weeds it makes), it should be applied broadcast and plowed in. When fertilizer is used in heavy quantities it must also be applied in the same way.

I often use a ton of cotton-seed meal in this way. While not a complete fertilizer for strawberries, nothing gives a finer plant-growth, and nothing is less apt, even when used in large quantities, to harm the newly set plants.

Run off the rows three feet apart; if you are short of land, two and a half feet will answer. But narrow rows are not as convenient to plow.

Sow evenly in the furrows 500 pounds cotton-seed meal an acre. If not easily to be obtained, use in the same way 300 pounds of the mixture hereafter given. Lacking both, then use 300 pounds good commercial fertilizer. If stable manure is liberally applied broadcast, as directed, none of the above fertilizers or cotton-seed meal need be applied at planting time.

Mix whatever is sown in the drill thoroughly with the soil by running down the furrow a cultivator or small harrow. List on this furrow with a light furrow from each side. The medium size wing will always throw dirt enough. Knock this list down very low with a drag or with hoes. An excellent drag can be easily made of an old plow beam and handles by nailing to or mortising in the beam a piece of scantling in place of the share. To the lower end of this scantling nail transversely a piece of plank twelve or fifteen inches long. As the horse draws forward the implement, this piece of plank, lying on and crosswise the list or bed, knocks it down low in proportion to the pressure exerted by the plowman. This device is a great saver of labor, and will last many years.

If the land is not too rough, and the plowman a

steady one, a nail protruding an inch or more downward from the center of the drag, can be made to mark a fairly straight line to set the plants by. I never use a line in field-planting, but depend upon a marker as above described, or put at the work careful men who can open the holes for plants in a straight line down the center of the bed.

For making the holes where a great deal of planting has to be done, a short pole, about four feet long, is best. This is sharpened wedge-shape at the larger and lower end. If the wood is very hard and the soil light, it will last some time as it is. It is better to have the wedge-shape, business end, lightly ironed. This iron should be of good metal, about three and a half inches wide and pretty sharp, to do good work.

With this implement, broad holes can be opened very rapidly and without stooping. Make the holes by driving down the pole vigorously a little in advance of you. Then by pressing it over as you go forward, it will be enlarged to the right size. Do not open the holes far enough ahead to get dry before the plants are set.

PLANTING.

When the plants are to be kept in hills, or stools —by far the most practicable plan, on a large scale, with intensive manuring and culture—about fifteen inches apart is the best distance to set. This requires 12,760 plants an acre. Some small-growing varieties may be set at twelve inches, and a few very large-growing ones require, on very rich soil, eighteen inches. They can be put two feet apart, and a few young plants only allowed to go out and occupy the space between.

This mode requires fewer plants (7,500) to the

acre, but great care must be taken, especially on rich soil, to see that the young plants do not set too thickly between the parent plants. If they do, fine berries cannot be expected.

The plants to be set should be kept well protected from sun and wind. A flour barrel, covered with a wet bag or cloth, set at the end of the rows and in the shade, if the sun is strong, is best.

The plant roots should be thoroughly wetted as they are placed in the bucket for dropping. If the roots are very long, trim them back to four inches in length.

The dropper—a boy or girl—can drop two rows, one on each side, and should keep only a few feet ahead, so that the roots will not dry before put in the ground. The planters should be reliable men or women, and should be charged to do their work well, instead of rapidly.

The plant should be set deep enough to cover the roots well, but never to cover the bud. The earth must be pressed firmly to the roots from the bottom up. Some planters have a way of pressing the earth firmly about the bud and leaving a hollow place around the lower part of the roots. In winter, while the soil is cool and wet, this might do little harm, but it would surely endanger the plants set in a hot, dry time. (See the cut, under Garden Cultivation, for the right depth to set.)

ANOTHER MODE OF PLANTING.

On any soil, not given to cloddiness, the following mode of planting will be found often cheapest and best.

Make and knock down the lists or beds, as above directed. But instead of opening holes for the plants with the ironed stakes, split the bed half open by running down it a plow with a small wing.

Against the smooth or "land slide" side of the furrow thus opened, hold a plant, with the bud just level with the top of the furrow, and with the other hand draw enough earth back from where the plow threw it, and press around the plant, to cover it well up to the bud. What little open furrow is left between the plants will be covered at the first working.

Plants set this way, if properly done, grow off very fast and are apt to do well.

CULTIVATION.

A very good crop of strawberries can be made by giving just work enough to keep down the weeds and grass. But cultivation, even if done only for this purpose, is more economical when done often. Not only the most effective, but the cheapest way, of killing weeds and grass, is before they appear. Three light workings with horse cultivator and hand-hoes cost less than one pitched battle with a grassy strawberry field.

Still, for the best results the soil of a strawberry field should be lightly stirred as soon after every packing rain as it gets in order to work. This stirring by breaking the capillaries—the minute channels through which the moisture rises to the surface and evaporates—has an immense effect in enabling plants to pass unharmed through dry, hot weather.

This can easily be proven by comparing, a week after a good rain, the soil of a cultivated field with one that has been left to bake and harden.

This stirring should be shallow—not over two and a half inches deep, and much shallower than that immediately around the plants.

The plowing should be done with a small-toothed cultivator, leaving a strip about six inches on each

side of the row of plants to be lightly stirred with hoes. Nothing is better for this than forked potato-hoes. But if the grass has got a start it will, of course, be necessary to use light weeding-hoes. This same mode of cultivation must continue as late as grass and weeds grow, or till about August 15th. It will pay to continue it till frost, especially if the fall is dry.

RUNNER-CUTTING.

If the hill or stool system is to be followed—usually the most profitable and almost the only practicable system with intensive culture on a large scale—the runners must be cut as fast and as late as they come.

Never allow any runner-cutting implement other than a knife to enter your field of stool plants. Any old knife, whetted on a brick, will do. A quick boy or girl can with it cut runners almost as fast as they can walk.

Runner-cutting devices are very good on smooth soil to narrow and keep within bounds matted rows. No device of this kind should be used on stool plants for the reason that they cannot cut the runners close. It is all-important that runners be cut close—between the first joint and the parent plant; if not, a plant will form at the joint to dangle there unrooted, sapping the strength of the parent plant till cold weather kills the parasite, as it does all vegetation. As, often half a dozen or more of these parasite plants will thus form and hang to each parent plant, the total harm done to an acre is immense.

The strongest objection urged against the stool system is that careless growers do not cut the runners in time—that they are left to grow long enough to rob the parent plant of vigor before being

removed. This, while too often true, is wholly inexcusable. Runner-cutting is exceedingly simple and inexpensive if done promptly.

MANAGEMENT OF THE MATTED ROW.

Where the system is to be followed a few—never too many—runners may be allowed to grow and set young plants in the space between the old plants. This matted row should not exceed a foot in width.

If proper care is to be taken to keep the young plants from setting too thick then the earlier in the season they set, the longer they will have to grow before frost, and the better. But if the bed is to be allowed to run wild and set all the plants it will, the earlier the start the worse the overcrowding will be.

Where such overcrowding occurs—and it is sure to occur on rich soils with most varieties—the bed should be thinned in the early fall. About six inches apart each way is a good distance to leave the plants. Still some rank-growing varieties will, on rich soil, need at least eight inches each way.

This thinning process can hardly be properly done except with trowels, and is exceedingly tedious, and indeed wholly impracticable, on any considerable scale. It is far better to control the number of runners, allowing only enough to come to form a thinly set matted row—always remembering that a very small plant in June or July can, before bearing time next spring, appropriate and indeed require, an astonishing quantity of space.

To thus control the runners is pretty sure to entail vastly more work and worry, and in the end more expense, than to keep them cut off.

Various runner-cutting devices are used to cut the runners as they seek to spread and thus keep

their thinly matted row, above described, within bounds. The plan almost universally recommended, to keep these runners thrown back along the sides of the bed, by constantly running a cultivator along the middles, going always the same way, is decidedly wrong. The result of constantly crowding runners back on the bed in that way is that it forms there a dense tangle of plants too crowded and spindling to bear much themselves or to allow the earlier set plants to do so. It is far better to cut off all the ends that encroach on the middle after the bed has become even thinly set.

The matted row must be kept clean by carefully stirring among the young plants with a small hoe and hand-weeding whenever the hoe cannot get all the grass and weeds.

The general practice of allowing the runners to mat as thick as they can, and then allowing weeds to grow in the bed and increase the overcrowding, cannot be too strongly condemned. I know of no better receipt for making five-cent berries, small, soft, pale and serving no purpose, but to glut and demoralize markets.

While many follow the matted row system, I have always found the stool system not only the most economical but with most varieties also the best. An acre in stool plants will make in a good season as many quarts of marketable berries as one in matted rows. It suffers far less from drought. The berries are easier to mulch and keep clean. Being also easier to pick, a large acreage can be picked with a limited number of pickers. It is also far easier to protect stool plants from frost. Taking all these things into consideration, together with the advantage in cultivation of stool plants, I do not hesitate in giving them the preference.

Still there are a few varieties which do not do

well when grown on stool or hill. The most noted instance is the Hoffman. Plants of this variety when stooled are given to "horning," in which the crown gets hard and woody and extends up above the surface somewhat like a horn.

COMPARATIVE ADVANTAGES AND DISADVANTAGES OF THE STOOL SYSTEM AND OF THE MATTED ROW.

The stool system costs more in the start, as it takes about sixty per cent. more plants and that much more setting, but in the end it costs less than the matted row, provided, of course, that both systems are properly carried out—and slip-shod, trifling measures no longer pay, in strawberries or anything else.

The result is rows of large, vigorous, deep-rooted, dark-green plants, capable of resisting drought during both the growing and bearing season. The crop of berries is apt to be, and the crop of marketable berries is almost sure to be, larger than in the matted rows. If drought comes—as it all too apt to do in berry times—the shallow-rooted matted row is sure to suffer most, and to suffer in proportion to the thickness of the plants. Then if the beds are at all too thickly set in plants the berries are sure in any season to be smaller, softer and paler in color.

Stool plants can be grown on soil ever so badly infested with weeds, and grow well, for they can easily be kept clean with the horse-harrow and hand-hoes. If these dense weeds grow up in matted rows, it is extremely tedious and expensive to destroy them. The richer the soil, the thicker they come and the faster they grow. The same spring warmth that brings the struggling plant into leaf and bud and berry urges the weed into rampant growth.

Scrape the beds ever so carefully in the spring —and they must never be omitted—before you apply the mulch, to keep the berries clean, there will yet, on most soils, grow up through the mulch myriads of weeds that can only be removed tediously by hand.

Yet I would by no means be understood to say that large crops of fine berries cannot be grown in matted rows managed exactly right. What I do assert is, that it is more expensive, more difficult, and requires more experience to manage matted rows than stool plants exactly right.

CHAPTER XIII.

GARDEN CULTURE OF THE STRAWBERRY.

Pet plants, like pet animals, are apt to be overfed and half killed with kindness as long as the whim holds, and then neglected in proportion when it is off.

It seems so easy to every one, of even ordinary diligence, to raise strawberries, that he wonders how anyone can fail in making them in abundance. If I had to give in two words the fullest instructions for their successful growing, these two words would be clean culture. The arch enemies of the lowly growing strawberry plant are grass and weeds. They not only weaken plant growth during the summer, but springing up betimes the following spring, rob it of sunlight and moisture, at the critical time of fruit-bearing. And it must be remembered that the young plants when allowed to run riot and densely mat, as they will, on very rich soil, are in effect only weeds.

Garden soil, like all rich soil, is almost sure to be badly infested with weed and grass seed. On this soil made still richer, the strawberry plants are

usually set. Often so much manure is applied, or it is so imperfectly mixed with the soil, that many of the newly set plants come in contact with it in lumps and are killed. Then while the petting lasts the plants receive vastly more cultivation than they need. The mood of petting over, they are neglected.

The result is that before the summer is past the strawberry bed is a forest of weeds so rampant and dense that one has to part the weeds to find the plants, and even then does not always succeed.

Had the same cultivation crowded into four weeks been spread over four months, rows of vigorous, deep green strawberry plants would have stood where now stands the unsightly tangle of weeds.

I have begun thus backward in order to emphasize the all-important point of raising your strawberries on one bed and your weeds on another—never both on the same one.

The gardner confined to a smaller area has not the same choice of ground that the farmer has. Still I would refer him to what has been said in a former chapter about the comparative fitness of different soils.

On a sunny spot to the south of buildings berries ripen earlier and to the north of them later. Whenever practicable, it is a good plan to plant your earlier varieties in the southern exposure and your late ones with a northern exposure. The period through which this delicious fruit can be enjoyed will thus be very greatly prolonged.

If the spot chosen is already very rich, no more manure need be applied before planting. If not, apply broadcast *well rotted* stable manure, chopped very fine, an inch deep. Also unleached wood-ashes, at the rate of a bushel to every twenty-five

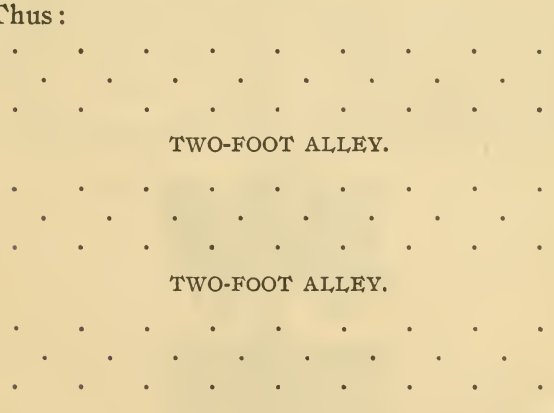
square yards—that is, to every five yards square. If leached, three times as many can be used.

Chop in, mixing both *thoroughly* a foot deep with the soil, always remembering that manure not well mixed is poison to newly set plants. Cotton-seed meal, at the rate of ten pounds to every twenty-five square yards, will do as well, and in some instances better than the stable manure. The ashes should always be used if to be had. Chicken droppings can be used in place of the stable manure, and is about half the quantity.

Where the above manures cannot be obtained, any reliable festilizer, rich in potash, will answer, using it at the rate of *not over* ten pounds to twenty-five square yards.

The plants should be set a foot apart in the row, and the rows one foot apart. Between every series of three rows leave an alley or walkway two feet wide.

Thus:



The bed or plat on which the plants are set should have all clods broken fine and be raised little, if any, higher than the general level of the

garden. Every inch you raise the bed, the more it will suffer from drought. Care must be taken that the rain-water from the rest of the garden does not run over the bed and wash it. Dig a broad, shallow trench, banking the dirt next to the bed, if necessary.

Use a line to plant by so as to get the rows straight. If the plants have very long roots, trim them back to about four inches. Open the holes with a dibble or garden trowel, deep enough and broad enough to allow the roots to be spread out like a fan. If no dibble or trowel is convenient to be had, one shaped and sharpened from an old shingle or piece of thin plank will answer. Drive it straight down, so as to let one side of the hole be perpendicular. Against this perpendicular side set the plants. Never set them in a hole deeper than the roots are long. Let the earth come closely around roots with no hollow space at bottom, the hole not to be so shaped that the roots will be crumpled up or be placed in any other position than a perpendicular one, or as near such as a partially fan-shaped position will admit of.

Plant just the depth shown in following cut.

The plants should be set just deep enough to cover the roots well and no deeper. Press the earth firmly around the roots. The bud must not

be covered. A great many plants are set two deep, resulting in smothering and retarding growth.

If the soil is very rich or the plants are of a large growing variety, it will be better to set them fifteen inches apart each way than twelve inches, as rccommended.

South of the latitude of Washington, D. C., planting can be done any time from September 15th to April 15th, except on very stiff, wet soil, subject to heaving during hard freezes. As on such soils newly set plants are liable to be lifted out of the ground and their roots left exposed, it is better not to plant between November 15th and March 1st, unless a little straw, litter or coarse manure can be scattered around and over each plant. Stepping on the plant and compressing the earth about it after setting will usually prevent. Plants set on any soil at the North between those dates should be at once protected with mulch.

Yet plants can be set during fall and winter on any soil not then frozen, in any latitude, if protected by a mulch of straw or coarse stable manure, as above directed. In this latitude, where the thermometer rarely goes lower than ten degrees above zero, a mulch half an inch to an inch deep answers. In colder regions it must be increased in proportion.

The object of the mulch is to lesson the hard freezing and heaving of the soil. Coarse manure not only protects, but its properties leached into the soil by rains and melting snow, fits it exactly to nourish the plant.

The advantage of late fall and winter and very early spring planting is that then the soil is cold and moist; the strawberry plant is then the easiest of all plants to live. In summer, very early fall and late spring, it is the hardest of all plants to get to live.

Good plants, carefully set on rich soil in October, November, or even during the winter, will bear a fair crop of exceedingly large berries the following spring, which will ripen much earlier than the berries on older plants. Should drought come during bearing time, a young bed planted later than November, if allowed to bear, must be liberally watered; if not the young plants will be stunted and perhaps die from exhaustion. If properly cared for, as below directed, they will bear two more crops, making three in all. If set after march 15th, the blooms should be pinched off and the plants not allowed to bear to the following year. In that case only two crops can be obtained.

After two years the berries wlll run small and the plants unproductive, and should be plowed up, a young bed having been set the fall, winter or early spring preceding.

If the planting is done in the fall or winter, and only coarse, fresh manure can be obtained, it will be better to apply it around the plants after they are set, drawing some over them as freezing weather comes on.

CULTIVATION.

As before stated this is simple and easy, if done in time. A fall or winter set bed will need but little cultivation till the next spring. If coarse manure has been used around the plants it will be better to leave it undistributed till after the berries ripen. *But give weeds no truce.* Pull them out, dig them out, get them out somehow—winter, summer, spring or fall, as soon as they come.

As soon as the berries are all gathered, cultivation should begin. Stir the whole bed with a forked hoe about two inches deep, shallower just around the plant, after every packing rain. An hour's

work once every two weeks will usually serve to keep an average size bed in good condition. Keep this up as long as grass and weeds grow. It can then be discontinued, although cultivation till frost, especially if the fall is dry, will pay well. Remember always that the time to kill grass is before it comes. Stir the soil frequently and it can never come. Three hour's work a month for four, or even five months, is surely not a dear price to pay for a strawberry bed.

CUT THE RUNNERS.

Fail not to cut the runners as *fast* as they come. If cut before they joint and start a young plant, the parent plant will form a new fruit bud for every runner thus timely cut off. Every fruit bud means another bunch of berries the following spring.

Runner-cutting is ease and simplicity itself, if done in time. A boy with a knife—any old one whetted on a brick will do—can cut the runners from 500 plants in an hour, if done when they first come. This work should be done about every ten days.

If the runners are allowed to grow at will, they will, in a surprising short time, form a dense mat of young plants, which will mutually choke each other and the parent plant, and result in a poor crop of small berries.

Should a bed get thus over-run with young plants, it is always better, at the earliest opportunity, to chop them out with a weeding-hoe, digging as shallow as practicable, leaving only the parent plant. Or if that has been hopelessly overcrowded and drained of vitality, then chop it out and leave young plants somewhat closer together than the old plants originally were—say about ten inches

apart, if the thinning is done in summer, and six or eight inches if done in the fall, when the growing season is nearly over.

PREPARING A BED FOR FRUITING.

To insure a fine crop of large berries, manuring should begin the fall before. These directions are for a bed the fall following the fall, winter or spring in which the bed was planted. As elsewhere stated, too much manure rich in ammonia, as stable manure and cotton seed meal is, will if applied within six months before fruiting, tend to make berries soft, and they do not ship so well.

If the plants have made a luxuriant growth, showing the soil to be very rich, then apply in November around and between the plants one bushel of unleached hardwood ashes, or three bushels of leached ashes to every twenty-five square yards. Coal ashes are practically worthless for manure.

If the ashes cannot conveniently be had, five pounds of kainit or two pounds sulphate of potash will take their place.

But if the soil is not rich, as evidenced by large, vigorous plants, it will pay to apply around and between them stable manure, either old or fresh, to the depth of half an inch to one inch.

In regions cold enough for the thermometer to sink to zero or lower, the strawberry plant needs winter protection, especially on stiff, wet soil, given to heaving. This protection may be given by an endless variety of substances. Coarse manure, coarse straw, kept from blowing off with clods or stones, corn stalks, pine straw (the stand-by of the Southern grower) and in fact, anything that does not lie so close as to smother the plants, and not liable to be blown off too bad by winds. This pro-

tection should be applied just as the ground begins to freeze hard, here about December 1st to 10th, and be deep enough not to prevent freezing entirely, but to lessen hard freezes greatly. It must be taken off the plants about the time growth begins in the spring. Plant growth can be retarded and later berries grown by keeping the mulch or protection on a little later. But care must be exercised as it turns warm, not to keep the plants covered too late, or they will be bleached and weakened. I uncover here about March 1st.

Enough of the straw mulch must be kept around and between the plants to keep the berries clean. It can be thus left quite thick, and is a great conserver of moisture, if taken from over the plants and placed carefully around and between them, in the alleys and all.

There is great difference of opinion as to whether winter protection is best south of the latitude of Washington, D. C., or not. Crickets and injurious pests often find harbor under it to the harm of the plants. If not carefully applied it sometimes, during warm winter spells, bleaches plants and makes them tender.

I have, after years of experiments, adopted a modified system of protection. I use stable manure, applying it between and close up around the plants, but not directly on them, all the ground being covered except the plant. This enriches the soil and at the same time it greatly lessens the heaving ing of the soil from constant freezes and thaws.

If not manured the fall before, a strawberry bed may have the ashes or manure, as before directed, applied to it in the early spring or even at any time before blooming begins. Always remember that ashes, manure, or any kind of fertilizer, can be safely sown over strawberry plants in winter, while

they are in a dormant state. While in a green and growing state, it must be sown around them. But never sow anything, at any season, over the plants while they are wet with dew or rain. It will then surely stick and burn.

Five hundred plants divided between early medium and late varieties should, when manured, supply an average-sized family liberally with delicious berries for about six weeks. They will occupy a space about 20 x 40 feet, if set 12 inches apart each way. (See our catalogues as to best varieties.)

Advice as to marketing the surplus berries of the garden bed, and making it a real revenue, will be given under the general heading—Selling Berries.

CHAPTER XIV.

GROWING STRAWBERRIES IN A BARREL.

The most striking thing that I ever saw in the strawberry line was a barrel covered—fairly hid under a crop of strawberries. Any tiny bit of ground large enough to hold a barrel sitting upright will suffice for the purpose, provided sunlight can reach it for the greater part of the day.

Procure a barrel of any kind—whiskey, molasses or even a flour barrel will answer, though being smaller will not hold as many plants as the former kind. I see no reason why a kerosene oil barrel would not do. It would be of all kinds the most durable, being preserved by the oil it had absorbed.

Knock the bottom out of the barrel, or bore it full of holes with an inch auger or even a larger one. These holes are to allow any excess of water to run out. Choose the warmest, most sheltered

nook that you can find if in the sunshine from nine o'clock to at least three in the afternoon, and place the barrel in position Now bore the sides full of inch holes. These holes are to hold the plants. They can be only four inches apart each way, though this is rather close for the ranker growing varieties of strawberries At this distance a fifty gallon whiskey or oil barrel will hold about 125. The upper row of holes should not be too near the top of barrel, say fully six inches below. The lower row can be as near the bottom as you please. In boring these let the holes in each row dodge those on the row above, as shown in diagram for setting plants in garden bed. (See page 55). This method results in saving room and lessening the crowding of plants.

This properly done, fill the barrel with good, rich garden soil. A bushel of well rotted stable manure and a gallon of hard wood ashes should be mixed with the soil. But it must be thoroughly mixed. Any considerable excess of either, especially if the manure is fresh, will be apt to do harm and might cause complete failure.

Pack the earth firm as you fill the barrel and let it be full of earth with a slight depression in the center. This depression is to pour water to invigorate your strawberry crop.

As the barrel is being filled with the thoroughly mixed earth and manure set your plants with the roots inside the barrel and the tops outside. They should be far enough inside to allow the earth to cover the roots well up to the bud, just as in planting in the ground, but still not far enough in to smoother the plants. Careful observation with the first or bettom row of holes will show one how to set them. Continue to set as the barrel is filled, a plant ot each hole.

Except to apply water as needed, your work is now done. Only a moderate quantity of water will be needed till the plants begin to fruit, then a good deal more. See that enough water is applied to reach down to the bottom. But use judgment not to overdo either the manuring or the watering.

Plants can be set in a barrel as in the ground at any time from September 15th to April 15th. If the barrel is set in a warm, sheltered place berries will ripen in it a good while earlier than in the open. Protection can be given from frost or even a pretty hard late spring freeze by simply covering your strawberry crop with an old blanket or a few bags. Newspapers are great protectors, paper being a non-conductor of heat.

The quantity of berries that can be grown on a properly made, carefully treated barrel is prodigious. A small family might thus be liberally supplied for a whole season. An enterprising man or woman might easily have more than one barrel and might sell the surplus.

If necessary a moderate quantity of fertilizer or stable manure can be dissolved in the water and poured into the barrel. As plants thus set need never lack for either water or nourishment they should make a much better growth than those set in the open field, and bear larger crops soon after planting. A crop thus planted in fall or winter should bear a good crop the following spring, provided very large, well rooted plants were used and pains was taken in planting to speed the roots in a broad fan-shape, allowing them to adhere the maximum of food and drink.

By clipping all runners it might be practicable to keep a barrel in bearing till two crops are obtained from it. After that it should be emptied and more plants set in it the following fall. It

will be usually found best to get only one crop and thus replant.

The Continental Plant Company, Kittrell, N. C., furnishes collections of plants selected as to size and vigor especially for barrel planting. Also much more depends on the quality of plants in this mode of strawberry farming than any other. You cannot for a moment think of using any but the very best.

A barrel painted red and set with strawberry plants as above described forms as pretty an ornament as a front yard or flower garden can have. Then the novelty of the thing makes it a great attraction. It would be a drawing card in a florist's show window or any other show window.

CHAPTER XV.

MULCHING, WINTER PROTECTION, PROTECTING BLOOMS FROM FROST, ETC.

MULCHING.

I shall restrict the word mulching to mean the use of any material to keep berries clean, and incidentally to conserve moisture. I say incidentally to conserve moisture, because the mulching usually employed has only a very slight effect in that respect. Yet wherever it is practicable to apply the mulch thick enough a considerable saving of moisture will be the result, especially if the soil is stirred an inch deep and left in very fine condition just before the mulch is applied.

Proper mulching is one of the most essential parts of successful strawberry growing. Without it rain is almost sure to beat grit or dirt on the berries to their very great harm and depreciation of

value. I cannot recall but one spring in my twenty-eight years as a berry grower, in which mulching could have been dispensed with without loss.

Almost an endless variety of material can be- and is, used for this purpose. Pine straw, pine needles or pine shatters, as it is usually called, is, where it can be obtained, the ideal mulching materia'. It can be easily adjusted around and among the plants, and is not easily blown off. Oat straw, wheat straw, marsh grass and all kinds of hay, is used. But care must be taken to use nothing that will infest the strawberry field with noxious weeds (and all weeds and plants except strawberry plants are noxious, as the strawberry plant itself becomes when too thick.)

When any long, light straw is used it is best to cut it up very fine to lessen its liability to be blown off. Where enough coarse stable manure is properly applied no other mulching will be necessary. This is best applied about the beginning of winter.

No matter what kind of mulch is used, too much care cannot be used in applying it evenly and effectively. I use pine straw and apply it very early in spring, before the plants' growth begins. It is scattered *very evenly* over the plant beds and middles, and just thick enough to hide the ground well—about ten good two-horse loads to the acre.

When growth starts the plants come up through the straw, the berries forming above it, and therefore will be protected from sand dirt. Care must be taken not to have straw too deep over the plants. Ten loads *evenly* scattered will not be anywhere too deep.

On soil infested with weeds, such early mulching is hardly practicable, as the weeds start to grow almost with the strawberry plants, and unless scraped

out will, especially on rich soil, shoot up like magic, robbing the strawberry plants of sunlight and moisture at the critical time of ripening. Yet if a grower has no larger area than he can hand-weed well, the mulch can be applied as early as he chooses and the weeds pulled out as they come.

If the mulching is applied late, after the plants begin to grow, it will be best to place it carefully around the plants. Where the plants are grown in stools or hills, it is comparatively easy with the hand to place the mulch so close around the plants that it will be under the berries. When thus applied, it can be put on at any time up to the ripening of the fruit. But don't wait too late. Even half-grown berries can get, and remain, mud and grit spattered.

When mulch is used with a view to conserving the moisture in the soil. it must be applied much heavier than above directed. To do much good it must lie, after settling down, fully two inches deep over the whole grounds, beds and middles, though, of course, not on the plants.

WINTER PROTECTION.

Winter protection is chiefly used to lessen the heaving or lifting of the soil by hard freezing, and the mechanical injury done to the plants by the consequent breaking of their roots. Winter protection is necessary in any climate in which the winter temperature falls any below zero, and will probably pay, especially in stiff soils given to heaving, where it does not get quite that cold.

I have repeatedly tested the efficacy of winter protection myself with uncertain results. I have had it even after comparatively mild winters, in which the temperature did not go below 15 degrees above zero, to materially increase the crop of ber-

ries. Again, on the same soil, and after a similar winter, I could see no good effects. A strong objection to winter protection at the South is that crickets and other insect pests are apt to harbor under it and eat the strawberry leaves.

The best general rule south of the Mason and Dixon line is, until careful experiments have been made, to use no mulch covering except stable manure or barn-yard manure, applied around and between the plants, but not immediately over them. I have never known insects to harbor under manure. Ten or twenty large loads of manure can thus be used with splendid effect. It both protects and manures.

A good time to apply winter protection of any kind is just about the time the ground freezes hard enough to drive on without breaking the crust—say about December 10th for this latitude, and earlier as you go North. No matter what covering is used it must be mostly raked off before the plants' growth begins in the spring. It can then be scattered around them as a mulch.

PROTECTING BLOOMS FROM FROST.

This is chiefly and effectively done here as follows: Have your straw or mulch ready distributed along the middles by the time the plants bloom. Straw used for winter protection and which has been raked off and left in the middles, as plant growth begins, will be just in place for the purpose.

When frost threatens, or the Weather Bureau gives warning, the straw can be rapidly raked on the plants, covering and protecting blooms most especially.

This covering, to thoroughly protect, must be deep enough to hide plants and blooms well. Even if still deeper it will do no harm. It can, without

harm, remain as long as three nights on the blooms, and a night or two longer, if weather keeps cold. But it should remain on the plants no longer than necessary.

As soon as the danger is past rake it off and leave it in the middle nearby for next time. Both the rakings, on and off, can be very rapidly and economically done, and pays well. From ten to fifteen large loads of pine straw are used per acre. But a great variety of material can be used. Even pine or evergreen bushes of any kind are quite effective.

This mode of protecting may seem a simple and unimportant one. But it is not. All the most successful growers in this State, men who have accumulated fortunes by raising and shipping strawberries to Northern markets, owe their success and wealth largely to this simple device, a device embodying the ripest experience of the most intelligent and observant growers. By means of it they are able to grow early varieties, largely to defy frost, to ship large quantities of berries to bare markets and command high prices. This, too, while unfrosted fields are not ripening a berry. In fact it gives the progressive, alert grower the very chance he craves.

CHAPTER XVI.

FORCING STRAWBERRIES.

Any greenhouse may be used for forcing strawberries, if the plants can be placed close to the glass. But if they are placed even several feet below the glass, the plants are almost sure to grow up spindling and weak. As a rule, low walled pits, heated by brick flues, are best. Sufficient warmth

is sometimes derived from the fermentation of coarse, fresh manure, packed hard a foot deep in the bottom of the pit, and changed when it ceases to give heat.

Strawberries may also be forced in the window of a room, in which the temperature is never allowed to drop lower than ten degrees above freezing. Any lady with a hot-house could easily grow plants of strawberries along with her flowers, as the strawberry is hardier than most flowers. Very early berries can also be grown without heat in ordinary flower pits, covered with glass sash. The glass would admit the sun-heat, and shutters or straw thrown over the sash at night would keep out the cold. With a little care and skill berries might be obtained this way quite a month before ripening time out of doors. Where artificial heat is used they can be ripened at any time during the winter.

For the best results set young plants in five-inch pots early in spring. In July shift these plants to eight-inch pots, being careful not to break the clod of earth in which the roots grow. The soil in both pots should be rich and compact, with a few pieces of old sod at the bottom to insure drainage.

Both the small and large pots should, at all times, be kept plunged in earth, sufficiently watered, and all runners and blooms should be removed as fast as they come.

Very good, but not as large and productive, plants can be obtained by covering runners to root in June or July in four-inch pots, plunged in the soil along the rows for the purpose. These plants should, in the early fall, be shifted into six-inch pots, as above directed. It will be better to allow the plants to go through at least one freeze before they are housed.

The plants should be placed in the forcing-house about ten weeks before the time the ripe berries are desired. The temperature should be low at first. As the plants begin to grow, it should be increased to about 75 degrees and never allowed to fall below 50 degrees. A sufficiency of water must of course be applied to supply the needs of the plants, but too much has a most injurious effect. Use a syringe or very fine sprinkler in watering.

As much air as possible, without lowering the temperature too much, should be admitted, especially at blooming time. The middle of sunshiny days should, always in the dead of winter, be chosen for this purpose. Currents of air are very necessary to loosen the pollen from the stamens and carry it to the pistils of the blossoms. In some cases it is found necessary to use a soft camel's-hair brush to dust the pollen from one to the other.

Staminate, or self-pollenizing varieties should always be used for forcing. The best kinds for unskilled growers are varieties of the monthly Alpine berry, as they take more kindly to this process than any others, and can stand a lower temperature. But skilled growers find no trouble in forcing any of the choice, large staminate kinds.

CHAPTER XVII.

RENEWING OLD BEDS.

The best way to treat an old bed is to plow it under immediately after bearing—having a young bed set the previous fall, winter or spring. The land can then be prepared in full time for summer or fall vegetables. Sweet potatoes thrive well where an old strawberry bed has been plowed up.

But often, owing to lack of space, or, more apt, lack of providence, the young bed has not been set, and the old bed is the only resource for berries the coming year. I give the best mode of treating it to that end:

An old bed is almost sure to be a tangle of thickly-set plant and weeds. Cut all these down as closely as possible with a grass blade. Let the weeds and plant leaves thus cut get thoroughly dry; then loosen up with fork, or rake the straw used to mulch, then on some dry day burn the bed off. If no mulch has been used, and there is not enough of the dead plant and weeds to feed a fire, it may be necessary to scatter a little straw or dry litter over the bed to act as fuel.

This burning off, while not essential, is of great benefit. It destroys all insect pests, most of the pestiferous weed seed, and does the plants no harm. In fact, they are pretty sure to look better a month later than if they had not been through the flames.

Of course some judgment must be used in this purification by fire. It would be possible to use so much straw, have the fire so hot as to kill the plants; but this is not at all likely to be the case.

Well, the bed burnt over, or not burnt over, side the rows with a turning plow, leaving a strip about six inches wide. If the plants are scarce or scattering, it may be necessary to leave a wider strip in order to get a stand. This siding or "barring off" will at the same time smother all weeds and plants in the middles between the rows.

Now, with a weeding-hoe, chop out the plants left on the above strip so that they will stand about a foot a part. The width of a weeding hoe will be about right.

Ten days later sow in the furrow left by the "barring off," and also between the plants, 300 to

500 pounds per acre of the fertilizer recommended in the chapter on Manures. Then split the middles with a turning-plow, which will throw the earth around the plants. Even and smooth with a hoe. Thereafter cultivate and manure the bed or field as a young field, directions for which are given in the chapter devoted to that subject.

CHAPTER XVIII.

BREEDING UP STRAWBERRY VARIETIES BY SELECTION.

Deterioration, more or less rapid, seems to be the fate of all species of plants and animals. This process is arrested and reversed by selection, natural or artificial.

Owing to the variability inherent in the strawberry, deterioration, degeneration acts quicker than in other fruits. Only a very few exceedingly virile varieties, such as the old Wilson, have sufficient vigor and stamina to hold out over a quarter of a century. Many apparently excellent varieties have run out in much less than half that time.

We have long practiced the following simple and effective method which we believe will arrest, and in a great measure, reverse the process of deterioration. It calls for vigilance and perseverence, but the superiority of our plants in vigor and productiveness prove that it pays:

Go over the fields *in person* just as the berries are getting their full size, but before they ripen much—the ripening, seed-forming process, is what exhausts the plant. As you go over select the plant showing in the most marked degree the qualities that you desire. These qualities will usually be

vigor and healthfulness of plant and productiveness, size of berries and probably earliness of ripening.

Plants thus carefully and discriminatingly selected must have all blooms and berries pulled off, and marked by driving a stake down by each one, or, better still, removed with a garden trowel, taking up a large clod of earth with the plants, and reset on rich soil, disturbing the roots as little as possible, and watering if necessary.

The latter plan, while at the beginning more troublesome, is, in the long run, best and easiest. For the plants thus taken up can be set in a convenient place, each variety to itself, and given special attention. If marked and left in the field care must be used to prevent the runners of the chosen plants from running into and mixing with those of other nearby plants. Where those are left it will be best to chop out and destroy the nearest plants on each side to lessen the danger of this mixing.

One hundred to two hundred plants, according to the runner-making quality of the variety, will be required to make young plants enough to set an acre the following fall, winter or spring.

If these young plants are carefully transplanted the following fall, they will attain sufficient vigor by the next spring to admit of another selecting process, exactly similar to that of the spring previous.

This process of selecting can be continued indefinitely, and the bearing fields set as fast as possible in the bred-up plants. Thus, on the one acre set with plants grown from the selected two hundred, may be grown enough plants for the whole farm and more.

Every year after second year, if this plan is diligently followed, all the planting of each variety

can be done with plants grown from selected parents, and in a few years the result of these repeated selections will be apparent.

This plan has been attacked and decried. But when I asked my opponents whether they would value most the grogeny of a long line of Jersey cows selected in each generation for their superior butter-making qualities, or to have the offspring of a line of scrub Jerseys, noted for nothing but bearing a great name, and asked them why the selection process, so indisputably rich in results with both animals and plants, shall be of no effect with the strawberry, they were silenced.

A tree can be justly judged only by its fruit, and any plan or system only by its results. My mode has ended in success, and success is a powerful and sufficient argument.

CHAPTER XIX.

PICKING AND SHIPPING STRAWBERRIES.

Once begun, the strawberry ripens surprisingly fast. Daily picking will be necessary, unless very cold weather should intervene and check the ripening. While the cold lasts, picking every other day may be best. A sudden warm, wet spell will vastly increase the ripening and also tend to soften the berries, and calls for greater care in handling. If this spell should occur Saturday and Sunday, Monday's picking will be unusually heavy. Provision should be made for this by having an extra force of pickers promptly on hand. Besides, the fields should always be picked very clean of ripe berries on Saturday. It is better to gather all that are even a shade less ripe than would be taken on other days.

The berries should be picked as red and ripe as possible, to allow for transportation to market. Varieties naturally firm can, of course, be picked much riper than other kinds. Where refrigerator cars are used, the berries can also be shipped riper, as the cold air of the cars checks ripening in transit, at the same time that it keeps the fruit perfectly firm.

After testing all modes of ticketing and keeping count I am convinced that simple tickets are to be given for each cup of berries are best.

SORTING AND GRADING.

In the far South the strawberry maturing in winter, or very early spring, ripens slowly and unevenly. There it will usually pay to sort and grade the berries after picking, especially as long as prices remain high and the consumers capricious and exacting. But elsewhere, where the berries ripen quicker and more evenly, the handling necessary in sorting is apt to do more harm than the grading will do good. If the sizes are to be separated, it is better to have the pickers carry in the hand two cups or baskets, putting the large berries in one and the small ones in the other.

CONTROL OF PICKERS.

Proper picking, handling and packing is the most important part of strawberry culture. Many and many a crop of fine berries is ruined right here.

With only a small plot of ground in berries, which a man might pick with his own family or with a few pickers under his immediate supervision, the matter is comparatively simple. But with a greater acreage, necessitating the employment of a large number of pickers, strawberry-gathering be-

comes a business, calling for much judgment, and no little diplomacy, strategy and knowledge of human nature. With the pickers, who are sure to be more or less careless and irresponsible, largely rests whether the berries on which you have spent so much money or toil, or both, shall pay or not pay. It is, therefore, all-important that you offer every incentive and use every artifice to cause them to serve your interest, at the same time that they are serving their own.

Have not too few pickers or too many. Too few will not have the berries picked each day in time. With too many, each one will make too little money to make them eager to please and keep their jobs.

Women and girls make far the best pickers. They have a better eye for color and can handle the berries more deftly and nicely than the rougher sex. Boys are about the worst animals that can be turned into a strawberry field. The are apt to be careless, sloven and given to larking and pranking.

Then the female sex is naturally abstemious, man is an eater, and the boy beats the man. Some writers insist that the pickers be allowed to eat all they want—on the Biblical principle, I suppose, that the ox and ass that trample out the grain must not be muzzled. But I insist that the analogy does not hold. An eating picker consumes the largest, reddest and choicest berries himself, leaving you, as far as the cubic capacity of his stomach will permit, only the second or third choice. And a boy's cubic capacity is marvelous, where strawberries are concerned.

Again, most of the eating is done at the beginning of the ripening season, when berries are selling high. I tell you it costs money to fill a hundred, or even a score of stomachs daily, to keep

them full during the picking hours with twenty-five-cent-a-quart berries. Later prices drop low and you do not grudge him a feast, but lo! he is so surfeited on twenty-five-cent berries that he scorns eight-cent ones.

A good plan is to award to each picker for the season, or during good behavior, as many rows as she can pick properly and in time. Let each one bring a stick with her name written on it, to mark the rows. Then even at the expense of some inconvenience to yourself, let each picker, if diligent and industrious, pick and get pay for all the berries on their rows. I find this to have a wonderfully good effect.

Each picker feels that she has a property in her rows and cares for them as her own. She is careful not to trample the plants and unripe berries herself, or to suffer any one else to do so. An examination of the fields each day after the picking is done will show whose rows are picked the best and cared for the best. Some small but desirable prize should be given for the best kept rows.

Pickers should be constantly warned not to touch the fruit with their fingers. With each berry, should be pinched off a stem, nearly an inch long. These stems act as handles to hold the berries by till they are dropped in the cup, and also as springs to give elasticity to the cup of berries and prevent crushing. They also, by keeping the contents loose, aid materially in ventilation.

The cup—and by cup I mean a quart basket, made of thin veneering—must always be well filled and slightly heaped in the middle. Better have it too full and let a berry or two be crushed, than have it sent to market scant and scamped looking. A little settling is sure to occur on the way.

Each cup should be neatly and evenly capped off

with handsome berries—not necessarily the largest, but with attractive fruit, the brightest, reddest side up.

The packing should always be done in a conveniently located house or tent, where it will be protected from both sun and rain. Unless carriers are sent around to bring in the berries, it is best to provide each picker with a tray or picking stand. If this tray has a top to protect from sun and rain, all the better. Light, fairly substantial ones can be bought cheaply of the crate factories.

Where a large acreage has to be picked with a limited picking force, it is better to have carriers bring in the berries, so that the packers need lose no time.

Besides keeping a close supervision of the field it is well to have each picker numbered and to let each picker mark her number on every cup she fills. Then the cups can be examined and it can be found out who picks right and who picks wrong. Take a cup of berries and turn it bottom up into an empty cup now and then and note the number. Let it be widely known that many will be thus treated. Again, give some small but desirable prize to the one whose cups thus examined show the best picking.

CRATES.

Let the crates and cups always be new, fresh and clean, if possible. A light gift crate to be given with the berries will, as a rule, pay the best. *As to their size, depend solely upon the advice of the commission merchant you ship to.* Different markets require different sizes. The eastern markets calls mostly for a 32-quart gift crate.

I would like to say, in passing that the Southside Manufacturing Company, Petersburg, Va.,

owing to peculiarly advantageous conditions as to cheapness of labor, timber, shipping facilities, etc., can supply a better crate for the same money and as good crates for less money than any similar concern in the United States.

No matter how far you live, it will pay you to buy from them. Get up a club and order a carload. Freight to even a great distance will be very low.

PICKING WET AND DRY.

Much has been written as to the comparative carrying qualities of berries picked early when wet with dew or late when the sun dries it off.

Now, with refrigerator cars it matters less whether the berries are wet or dry, hot or cold. A chilling process begins as soon as they enter the car, and, with the best system, a drying, process as soon as the car gets in motion. Berries picked under the hottest noonday sun can be at once stored in them to carry perfectly. But for express shipments it is different. And to its superior quickness in getting berries to market before prices decline—and a day or two often makes a great difference—the express service will always be liberally patronized by strawberry growers.

Berries, to carry well by express, must be picked cool. Pick them dry if you can; pick them wet if you must. But pick them cool.

COMMISSION MERCHANTS.

There are bad commission men and good commission men, just as in all other walks of life. But as a class they are more sinned against than sinning. It is nearly always the shipper of poor, worthless fruit that the commission men treat wrong and steal from. Somehow the grower of

good berries happens not to get chiseled. Strange fellows, those commission chaps, who take the piddler's mite and forget the competent fruit-grower's pile. They must go on the principle that to those who have there shall be given, but from those who hath not there shall be taken even what little they hath. More likely the shipper of sorry fruit hath little or uothing to either take or make returns of.

But folly or wisdom, aside with it. Ship to no commission house that does not give good bank reference, nor till you ascertain from reference thus given that it is thoroughly reliable.

New York is the largest and, all in all, the best strawberry market in the world. Smith & Holden, 311 Washington street (New York), are not surpassed in that great mart as live and reliable fruit commission men.

CHAPTER XX.

SELLING STRAWBERRIES—FINDING AND CREATING A MARKET.

It has been truly said that of the necessities of life the demand creates the supply, but with luxuries the supply creates the demand. This is certainly the case with the strawberry. There is something so very captivating, so appetizing in the color and fragrance of this fruit, that its presence creates a lively demand, provided, of course, that the berries are large, ripe and luscious.

Of course, when the berries are shipped, all that the grower can do is to see that his berries are properly picked, packed in fresh, clean cups and crates, and shipped to a reliable commission merchant on the market in which the class of fruit he

grows will bring the best net price. This is not always, or even oftenest, the nearest market. For, as I have elsewhere stated, quick express and refrigerator service have made one market nearly as close as another.

But to return to the subject of creating a market for strawberries. With tact and perseverance this can be done in any town, village or almost any rural neighborhood, and a very small plot of ground made to yield a snug profit. There is no calling more congenial to a lady or in which her superior taste and neatness would be more telling.

While one should endeavor to grow only first-class berries, no matter for what market intended, those to be retailed at home should be not only attractive in appearance but thoroughly ripe and of a well flavored, good table variety. This is a point especially dwelt on in our plant catalogue, Continental Plant Co., Kittrell, N. C.

Your plantings should embrace early, medium and late varieties, so that your berry season may be as long as possible. As easy as the strawberry is to grow the majority of people, even though owning gardens, and even farms, will be found without them, and, as a rule, far more eager to buy them than to buy any other kind of fruit whatever.

The chief point is to let it be known as widely as possible that you have really ripe, choice berries for sale at a reasonable price. This can be done in various ways, none of which should, if practicable, be neglected. The mere fact of having fancy berries, daintily handled, is, in itself, a great advertisement. Personal solicitation, in which contracts may be made to supply families for daily table use and for preserving purposes, would sell large quantities in any neighborhood that I ever saw. Cheap hand-bills or posters printed at the nearest print-

ing office, which could, in most cases, be paid for in berries, would acquaint the people with your wares. Doubtless an "ad" could, on same terms, be placed in some paper circulating largely in your vicinity.

Custom once obtained, see that it is kept by treatment both courteous and square. Never sell berries till they are not only red, but ripe, no matter how urgent may be the demand for them at the beginning of the season.

Follow the direction given in the chapter on Garden and Field Culture, to have the berries clean and perfectly free from grit. Pick them carefully and pack them honestly. Let the cups be topped off handsomely and attractively as possible, but have nothing underneath but clean, sound, ripe, toothsome fruit.

A good many might be sold by getting the village merchant with whom you deal to display them at his store. But a far more effective way to rig up some inexpensive conveyance and send them from door to door. Berries can be thus sold and orders taken for delivery the next day or when needed. A live, active boy is invaluable for work like this. Indeed, I find that a boy will work harder and more cheerfully and interestedly to sell strawberries than anything else, watermelons not excepted. If he has an interest, be it ever so slight in the berries, all the better for your pocket.

The cups or baskets cost little—about one fourth of a cent—and where convenience requires may be left with the berries and collected at the next visit. If it is necessary to throw in the cup to effect a sale, do not hesitate to do so.

A quarter acre patch set in strawberries of good varieties can, without any real expense, be made to yield at least 1,000 quarts. Stable manure and wood

ashes will be the only manure essential—full directions for this being given in the chapter on Garden Culture. A considerable higher average can be usually counted on, but even at five cents a quart the 1,000 quarts will bring $50. This is at the rate of $200 an acre and the estimates as to yield and price is surely a very moderate one. The whole money outlay of growing and gathering would be nothing except cost of cups and crates—about 35c. for 32 quarts—and these should last at least five seasons. More fragile ones to last one or two seasons can be bought for 25 cents.

CHAPTER XXI.

PROFITS OF STRAWBERRY CULTURE.

It is amusing to read in the light of recent progress what the writers of even ten years ago have to say as to the requisites for success in strawberry growing. The chief requisite given was nearness to market. It is also given, as very essential, that as pickers are unreliable and hard to get, a man should have a family large enough to pick his crop of berries, or rather let his acreage correspond with the size of his family. The grower is also warned that he had best not venture, unless he can get cheap labor and cheap lands.

This advice has now quite lost its force. Quick express transportation, and above all, the perfection of refrigerator cars have virtually annihilated space, even for a fruit as perishable as the strawberry.

Strawberries grown in Southern Florida, or Lousiana, are now delivered in New York, Boston, Chicago or Montreal, practically as fresh as those grown within ten miles of those markets, and at

reasonable transportation charges, all things considered.

Then strawberry growing has been developed and systemized into a regular business as so many other things, once insignificant, have been. When, twenty years ago, I put three acres in strawberries, it created great concern in the neighborhood. My neighbors, who were growing half acre and quarter acre patches, warned me that I would be sure to lose my crop for lack of pickers. I never lost a quart from this cause, and I now grow two hundred acres.

The most valuable agricultural or "trucking" land in this State, is now devoted to the strawbery. Town lots, worth $500 an acre, are planted in them, with a handsome profit on the investment.

Again, as a proof that profit does not always depend on nearness to market, the largest profit authentically reported, as ever made on a whole acre—$3,000 was made in Bradford county, Florida. I know several growers who have shipped their berries nearly one thousand miles and netted $600 an acre. I have, myself, netted $900 on an acre and a quarter, on one occasion, and $600 an acre on my whole crop.

Of course, the above were exceptional cases, Yet, they were indications in every instance, showing what skill and industry can accomplish in strawberry growing, when fortune favors.

Strawberry growers, like men in all other lines of business, a few years ago, suffered from the hard times or general business depression. Some made no money, and nearly, or quite all had their profits cut down for the time being. Nor can the enormous large average profits once obtainable by the grower of a few acres, he now realized on the same scale, much less on the far larger scale, on which

growers now operate. But the now prevailing good times will make a fair profit as sure in strawberries as in any business whatever. Everybody has money to spend. The strawberry industry will share in the general prosperity. Never was their a better showing for alert progressive growers.

But under fairly favorable conditions—and refrigerator-car service has vastly widened the area in which those conditions are to be found—large profit is to be made in strawberries. Though, the high old-time prices are not to be expected, the demand has vastly increased, the commission men are more business-like in their methods, and sales are quicker and surer, and returns likewise.

Then the quickness with which this crop can be grown and marketed—nine to twelve months on the Northern and Middle States, and often less than six months in the far South—is greatly in its favor, as compared with other fruits.

Decidedly, the most prosporous fruit-growers in this State are those who grow strawberries exclusively. In fact, with the possible exception of the peach districts of Georgia, the strawberry districts of the South are the most progressive and prosperous of all. Despite the croaking of pessimists, experience and close observation assure me that a competent man, in that he has larger facilties, has larger opportunities for profit in strawberries now than formerly.

Nevertheless, in the future, even more than in the past, the intensive grower, the man with the small, highly-manured, perfectly-cultured acreage, who superintends all, and does as much of his work as possible himself, will make the largest crop in proportion. He will do this for the reason that he will have better berries, better handled and more of them to the acre than the man who has to trust argely to the muscle and brain of others.

CHAPTER XXII.

IRRIGATION.

Ninety-five per cent. of the strawberry is water. With plenty of rain an acre will produce double, and often more, berries than it will in even a slight drought. The value of water at the right time is of the greatest value.

Irrigation has of late attracted much attention. Much has been written on the subject. In regions where irrigation is a custom, and where water is a commodity to be bought like other things, regular rules exist for watering strawberries as for most other things.

There the water is conveyed from the irrigation canals by lateral ditches, which divide it up and carry it to all parts of the field. On each side of these ditches are plots 20 x 60 feet made perfectly level. The 20-foot side of the plot abuts on the ditch. The plots are divided from each other by banks or ridges of earth eight inches high.

The strawberries are irrigated by turning the water from the ditches into these plots. The object of having each one of them perfectly level is that the water, when turned in, will spread at an even depth over the whole plot and soak in without rising anywhere high enough to get the berries muddy. It is cut off before rising high enough to do harm in this way. A dry soil will thus absorb a great deal of water—four inches being the usual quantity applied at the time in California. The moment the soil dries off sufficiently it is stirred an inch or two deep and left very fine to break the crust and lessen evaporation.

Where strawberries are in any region to be watered from wells or from small and quickly exhausted

streams, it will be necessary to collect the water in advance in cisterns or reservoirs. These reservoirs can be made of any size by banking up earth in the shape of a huge bowl, the inside lined with cement.

This reservoir, which can be filled by wind-mills or my steam or hand pumps, must be so placed that the water can be led from a flood-gate to all parts of the field. Lateral ditches may be made with level plots on each side for the strawberries, and the whole process conducted as above described.

But in all but the most arid regions a much simpler mode can be, has been, successfully put in practice.

Select for berries a piece of land so sloping, and run off the rows so that there will be a very slight but gradual fall from the higher to the lower end. A little ingenuity can run the rows in almost any field with that result. If they bend and wind it matters not.

The plants should be set on low beds or "lists," as directed in the chapter on Field Culture. In the course of cultivation more or less depression will be created between rows set very low, or apparently quite on a level.

Now the water can be led from the reservoir by a ditch running transversely along the higher end of these rows and with a shovel turned into each row or series of several rows at a time. If the fall is very slight, say one inch to twenty-five or thirty feet, and only a small stream of water is allowed to run in each row, it will flow slowly, largely soaking in as it goes. By the time it reaches the lower end the middles will be wet and miry. From the middles it will be gradually absorbed by the beds. The plants will also soon throw out roots to reach the middles, which will, of course, always be wetter than the beds.

A great deal less water will be reqired than by the California plan. But it should be applied much oftener, say once a week while the drought or even dry weather last.

Through the greater part of the country, even in the severest droughts, vast quanities of water still flow along the streams, large and small. This can be used to irrigate strawberries; both during the summer when the plants are growing and in spring when the berries are farming and ripening.

Plant berries along these streams, each row with a gradual fall as above described. If possible, convey the water by a ditch to the head of the rows, where it can be turned into them, as instructed. But never plant on ground subject to be overflowed by freshets in the stream.

It will not very often be the case that the plants can be placed above all danger of overflow and still have the water brought to them by gravitation—by natural flow. Therefore it will usually be necessary to raise the water by pumping. A steam pump using gasoline as fuel will be found perfectly effecrive for this purpose and not very expensive. The steam pump can be provided with wheels and moved as needed. The water can be carried by means of hose which can, by one man, be moved about from row to row; or a shorter hose can be used to carry it to a ditch, in which it can be conveyed to the upper end of the rows. There is scarcely any limit to the distance and height water may be thus conveyed.

The plan, while not altogether as effective as the more expensive and elaborate California system, is perfectly practicable. This steam pump will cost about $200; the hose in proportion to its length. No engineer is needed where gasoline is used as a fuel, as it is self-feeding. The cost of fuel will be

less than one dollar a day. Only two men will be needed to control the hose and water flow. Windmills can in many cases be used in place of steam. The wind-mill and pump might be placed on higher ground and the water drawn by suction through a hose to the pump.

It will, in regions tinble to spring and summer droughts, pay to buy and run the outfit for three acres of berries under intensive culture.

One such pump would, working every day, raise enough water to irrigate at least twenty acres by the plan heretofore given, or the water thus raised can be used according to the California system.

Garden beds can be watered with a sprinkling-pot or by means of a hose from a force-pump at the well. Cold well water will do no harm if applied while sun is not hot. After sundown is the best time. Never sprinkle water over the plants while the sun is shining. This of course, does not apply where the water is conveyed along the rows as above described. In such cases it does not to any great extent touch the foliage of the plant. Still, were it practicable, night would be the best time for all kinds of irrigation. For then the water soaks in and does not bake the soil as it might in a hot sun.

CHAPTER XXIII.

STRAWBERRY PESTS AND THEIR REMEDIES.

WHITE GRUB.

Probably the worst enemy that the strawberry grower has to contend with is the white grub or grub-worm, as it is commonly called.

This grub is produced from the egg of the May beetle—June-bug, as we call it. There are about

sixty distinct species of this pestiferous beetle found in the United States. All are alike in their predatory habits, feeding on the roots of grass and small plants, among which is unfortunately included the strawberry.

They usually attack strawberry plants in June and July. The leaves of a plant will be seen to suddenly wilt. A very slight pull at the plant shows that every root has been neatly cut, leaving it a mere stub standing in the ground. The grub that has done the mischief will be found in the ground nearby.

I never lost one plant in a hundred from this enemy, but I have seen fields very badly damaged thereby. But the remedy is easy, or rather the prevention.

Nature prompts the beetle which produce these grubs to deposit eggs in untilled soil, where its progeny, as it comes on, will find plenty of grass roots for food. If strawberries are always set on land that has been cultivated for the two previous summers, there will rarely or never be enough of the white grub to do material harm. Two years culture is best as the grub stays that long in the ground before being transformed into the beetle.

It must not be understood that strawberries cannot be grown on any soil unless it has been in cultivation for two years. But such soil is always the safest. I rarely have trouble in planting on ordinary farming land that has had one year's clean culture. Cultivation seems to destroy many grubs A great deal of planting is done in Eastern North Carolina on freshly cleared woodland, the grub rarely infesting woodland, although, owing to the excess of undecayed vegetable matter in such soil, it is harder to get a stand of plants.

Sod land, meadows and pastures that have long

been in grass, are to be especially avoided. In such the grub is almost sure to abound. The beetle seems to prefer soil trampled and hardened by cattle to bore and deposit its eggs in, especially as there is no lack of grass and herbs. Such soil must have two years tillage before being set in strawberries. It is then as good, and often, owing to the richness in decayed vegetable matter, better than almost any other. It is said that land that has stood only one year in clover will not be infested with grub.

When a field of strawberry plants begin to suffer from the grub, there is no remedy but to bear it with the best grace you can, and resolve to make a wiser selection of soil next time. No insecticide can reach him far down in the soil. You can wreak vengeance on the criminal after the crime, but you know not how many plants may have another of the same ilk lurking within an inch or two of their roots.

CUT-WORM.

This is a brown, green spotted worm, about an inch long at maturity, which in spring destroys young, tender plants by cutting them off just below the surface of the ground. It gives little trouble on soil that has been tilled for two years, or even one year. Cow pastures are nearly always badly infested with them.

The cut-worm can be killed by scattering over the plowed fields, a week before the plants are set, cabbage or turnip leaves, on which is sprinkled paris-green. The worm will seek food, eat and die. But this is tedious and expensive, and hardly practicable on a large scale.

With the cut-worm evil, as with most others preventives are cheap and easy, cure hard and expensive. If plants are set very early in the spring they get too vigorous by the time he appears to suffer

harm. It is almost entirely newly set, tender plants that he harms.

THE STRAWBERRY WEEVIL.

This is a minute beetle, the female of which deposits its eggs in the blossom just before it opens and cut the stem, so that it may fall and furnish food for the larvæ when hatched. As this food consists of pollen, only the staminate varieties or pistillate varieties that are in some degree staminate, are mostly attacked. This insect also, occasionally, attacks the blackberry, dewberry, and black raspberry. The only harm it does any kind of berry is in the destruction of blooms and consequent lessening the crop of berries. While occasionally destructive to a field, an inconsiderable part of the berry crop of the country is ever lost through this weevil.

THE STRAWBERRY CROWN MINER.

This is a pinkish insect, about one-fourth of an inch long, which bores into the crown of the plants. Though sometimes a great pest, it rarely does much harm.

THE STRAWBERRY LEAF ROLLER.

This is a small green caterpillar which sometimes does harm about blooming time, by rolling up its leaves to the great weakening of the plant.

THE STRAWBERRY BLIGHT.

This blight gives trouble in some sections, especially during dry, unfavorable seasons, when the plants are not in their full vigor. Only a few varieties suffer much from it, while many are entirely exempt.

The above, while not all the pests that harm the

strawberry, are all that do any considerable harm, and all that need be guarded against.

REMEDIES.

The only effective remedies for—or rather preventives of—white grub and cut-worm have been already given. Paris-green spraying is sometims used to destroy the leaf roller—care being taken not to use it after the berries get much size. But fire, the great purifier, is the safest remedy for all, the white grub and probably the cut-worm, excepted.

Mow the infested beds late in the fall and burn the leaves where they lie as soon as dry enough. Repeat this in June as soon as the crop is gathered. If the mowed plants do not burn readily, scatter enough straw over them to make them burn. The spring mulch can be used for the June burning.

The pests will thus be destroyed or largely checked, and the plants will suffer no harm, unless no judgment is used in the burning. My mode of burning is to mow the foliage of the plants as closely as possible; allow it to dry a day or two; then loosen up the mulch, if any, with a rake and on a breezy day set fire to the field or patch and let it burn quickly over.

It is also good to move infested beds and plant on fresh soil.

Spraying with Bordeoux mixture early in the spring as growth begins well, again just after fruiting and again a month later will check rust or blight. Fields so infested one season but if kept in, better be treated the spring and summer following. That is if the rust or blight becomes harmful, which will surely be the case.

CHAPTER XXIV.

SERVING, PRESERVING, COOKING, CANNING, ETC.

HOW TO SERVE.

Never wash a strawberry. If you are too indolent to mulch your bed thoroughly to keep grit from the fruit, you don't deserve to eat it at all. Washing spoils berries as effectually as anything. It spoils their looks—converting a thing of beauty into mere slops. It spoils their taste—converting the finest of racy flavors into worse than insipidity. It spoils their healthfulness—converting the most wholesome of acids into fermenting sourness. If the washing is done and sugar applied some time before eating, the crime will be complete.

Having given the way not to serve the Queen of Fruits, I will now give the way to serve it: Cap the berries just before they are to be eaten—(the new-fangled way of serving them uncapped for the guests to cap may do where they are enormously large). Pile them lightly in glass bowls and let them be handed round with powdered sugar and cream for the guests to help themselves and sweeten to taste. It is rarely that any two people like the same quantity of sugar on fruit, while the strawberry, if sweetened and kept, deteriorates rapidly in the estimation of people who really appreciate it.

HOW TO PRESERVE.

One pound of capped strawberries to one pound of sugar. Put in preserving kettle over slow fire till the sugar melts. Then boil fast for twenty or twenty-five minutes. Take out the fruit with a perforated skimmer and fill a number of glasses or small cans three-fourths full. Boil and skim the syrup five minutes longer; then use it to fill the

glasses or cans ; seal up while hot and keep in a cool, dark place. Being an exceedingly delicate preserve, more pains is sometimes necessary to prevent moulding on top. Some careful housewives pour a thin layer of melted suet over the preserves after they get cool in the glasses or cans. The suet can easily be removed in a cake before the preserves are used. However, paper pasted over them, and brandied or greased to exclude the air, nearly always answers quite as well. For preserving, the berries remain whole better if not too ripe.

HOW TO MAKE STRAWBERRY JAM.

Mash the fruit with equal weight of sugar and cook till thick and done. One pint red currant juice to four pounds strawberries, while not essential, improves the jam greatly.

STRAWBERRY JELLY.

Mash the fruit and squeeze through a bag. To every pint of juice add three-quarters of a pound of sugar and boil briskly twenty minutes or till it "jells."

Jelly is easier than preserves to keep.

STRAWBERRY WINE.

Three quarts of strawberries mashed and strained will yield about one quart of juice. To this add one pound of sugar. Mix thoroughly and place to ferment in clean cask with bung open. As soon as fermentation ceases cork up closely or, better still, draw off in bottles and cork tightly. Some add equal parts of water to the juice, but it is better without.

STRAWBERRY CORDIAL.

Stew ripe strawberries twenty minutes and strain through a linen bag. To each quart of juice add

one pound of sugar and one pint of good brandy. Let it stand two weeks and filter through coarse muslin, or, better still, filtering paper, and then bottle. It is excellent.

STRAWBERRY VINEGAR.

To a quart of fresh strawberries add a quart of pure apple vinegar; let it set for a day and night. Strain and add every morning a quart of fresh berries to the juice, till in all three quarts have been added. Then to every pint of juice add one pound of sugar. Bottle and cork tightly. With ice this makes quite a popular summer beverage.

STRAWBERRY SHORTCAKE.

Rub a large spoonful of lard and one of butter into a quart of sifted flour; put in a little salt and make a dough of cold water. Roll it out into cakes about the size of a breakfast plate; put on one of these a layer of strawberries and sprinkle with sugar to the taste; then another cake, a layer of strawberries and sugar, and so on till sufficient thickness has been reached, topping off with one of the cakes. Bake slowly and serve with sugar and butter sauce.

ANOTHER STRAWBERRY SHORTCAKE.

Bake the above cakes a little thicker, tear open and spread with fresh, ripe strawberries, sweetened and mixed with cream, It is then ready for the table.

STRAWBERRY SHERBET.

To two quarts of ripe, fresh strawberries well crushed, and one quart of water and tablespoonful of gelatine and the juice of one lemon. Let stand one hour. Strain through cloth, squeezing it hard, over one and a quarter pounds of sugar. Stir till

sugar dissolves. Strain again and freeze in ice-cream freezer.

CANNING STRAWBERRIES.

For canning and preserving it is better not to have strawberries too ripe. They remain whole better if not too ripe. For all the other above receipts, except preserving, they must be thoroughly ripe.

CHAPTER XXV.

GOOSEBERRY CULTURE.

The gooseberry is fast growing into favor, not only for pies and tarts in the green state, but is a dessert fruit when ripe. In both forms it is very wholesome and palatable. It affords an agreeable variety in the succession of fruits, and is so prolific that a few plants, occupying a small space of ground, will afford a plentiful supply for many years.

The gooseberry thrives best in the shade. It is successfully grown between the trees in orchards.

Like the currant, when planted in the garden, it should be placed in the coolest, shadiest part. To the north or east of buildings or fences is a good place. A grapevine trellise to the west of the gooseberry plants give them much relief from the hot evening sun. Still, they are often grown in the open, without any protection.

A moist soil suits it best. During droughts the soil, as for all crops, should have frequent shallow stirring. The effect of this stirring in preventing evaporation and keeping the soil moist is astonishingly great.

The gooseberry requires a rich soil. Ashes lib-

erally hoed in for two feet around the plants are good. In fact, the system of manuring recommended for the strawberry will suit the gooseberry. The plants should not be set closer together than four feet. Plant in late fall, winter or early spring.

The great enemy of the gooseberry is mildew. This can be successfully checked by spraying, at intervals as needed, with sulphur water—half an ounce of liver of sulphur (a compound of sulphur and potash, to be had from druggists)—to a gallon of water. Mix well and keep mixed by constant stirring. A spray pump affords a perfect means of applying all such insecticides, fungicides, etc. But comparatively few gardners own spray pumps. Syringes are made to be used where a little spraying is needed and are much cheaper than pumps. Remember that the object is to apply the liquid as near like a spray as possible, but never too heavy, as the liquid then runs off.

DEWBERRY CULTURE.

The dewberry is by long odds the surest and most prolific bearer and the freest from rust of the blackberry family. It thrives on a greater diversity of soil than any other. It is also earlier and more profitable in all ways. The medicinal value of dewberry wine and dewberry cordial has long been recognized. As a fruit it is exceedingly wholesome and can be freely eaten by old and young.

The plants should be set about four inches deep and four feet apart each way. In field culture it is customary to set them somewhat further apart each way for greater convenience in plowing. The rule in field culture is to run off the land four or five feet apart, then cross these at right angles by rows the same distance apart and set the plants where

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the furrows cross. This is called checking. This plan admits of plow cultivation both ways and leaves only a small square around each plant to be cultivated with the hoe. A small tooth cultivator is the proper plow to use. Cultivation should continue as late as weeds and grass grow.

The same manuring recommended for the strawberry should be given the dewberry. As the plant is a running one it should be tied up every spring to a stake. This keeps the berries clean and also facilitates ripening. The stakes, if of some durable wood, lasts for years. The same plants continue to bear well for ten years or more.

The old canes die as soon as they finish bearing and should be cut out and burnt before the next bearing time, the sooner the better. The new canes which grow out early in the summer mature and bear the crop the ensuring spring.

The mode of propagation is from the tips of the canes. These can be pressed down in the newly plowed soil about September 1st. They soon take root. When dug the following fall to plant about eight inches of the cane tip should be cut off with the new plant.

Dewberry plants can be set any time from October 15th to April 15th. Late fall and winter at the South and late fall or very early spring at the North, is the best time. We plant in November, December, January, February and March.

While the dewberry is usually tied up to stakes driven in the ground for the purpose, some success has been obtained in letting them run on the ground and mulching them like the strawberry. When this mode is followed they should be kept cut back to not over two feet in length. My experience is that if thus grown they are later in ripening than if tied up to stakes.

RASPBERRY CULTURE.

Both the black and red raspberry should be planted about the same distance apart as that recommended for the dewberry. That is, when largely planted. In garden culture they can all be planted along the borders of walks, next to fences, and in many spare corners not otherwise utilized. When thus planted they should be set four feet apart. This may at first appear a waste of ground, but as the raspberry plants last for many years, increasing its number, of course, every year, closer setting would soon result in crowding.

The same manuring recommended for the strawberry, and in the same quantities, and at same period, should be applied to the raspberry, dewberry and blackberry. Red raspberry plants are propagated by suckers springing up around the parent plant, like the blackberry. The black raspberry, or black cap as it is called, is propagated like the dewberry, by thrusting the tips of the vines down in the loose soil. As soon as the old canes bear they should be cut out and burned, leaving the young canes to bear the succeeding year.

When the young canes are eighteen inches to two feet high the tips should be pinched off. Snap off about two inches of the ends. This makes them stocky.

In field culture the raspberry is never tied up to stakes, as is necessary with the dewberry. In garden culture the vines look better tied to light trellises, but it is by no means necessary.

The raspberry thrives on almost any soil, but does best on such soil as is recommended for the stawberry. It is a mistake to suppose that the raspberry thrives only on wet soil. If there is any difference they need a slightly dryer soil than the strawberry.

Black raspberry culture has of late years had a serious set-back in anthracnose, a disease which kills many canes of that summer's growth and cuts off most of the crop the following spring. Repeated spraying with Bordeaux mixture, formula for which is given at the end of this manual, is recommended for anthracnose. The following plan is simple, and as far as tried seems to be effective: Cut off and burn the first crop of young canes about the middle of June. A second crop of canes will at once shoot out, and the second crop seems to be less liable to disease than the first crop. The same remedy seems effective when the dewberry runner is attacked by any enemy or disease. But the cttting off must not be delayed till too late. It should be done as early as the canes or runners get a fairly good growth, so as to leave full time for others to grow out and manure.

Invalids who can touch no other fruit whatever eat the raspberry, not only with inpunity, but with absolute benefit. Of all dessert fruit it is the daintiest and most delicate and the most delicious.

GRAPE CULTURE.

The grape seems to have been the very first fruit, if not the very first plant of any kind, cultivated by man. Far back before history began the rude stone monuments and inscriptions show that man tended and valued the vine. And to this day he has found no more delicious or more wholesome thing than the clustered fruit it bears. In literature and in art the vine and the grape holds the primacy of all fruits and form of growth. Chiseled in stone they adorn in fadeless beauty the architectural glories of forgotten civilizations, and their praise extends a golden thread back through prose and poetry from the very beginning.

This preference alone vindicates the taste of primitive man, proving him to have had in the main a true conception of the beautiful. For the vine ladened or unladened with fruit is the most graceful and beautiful of nature's productions. It is well worth growing for its beauty alone, as it is for its fruit alone.

For field culture the vines should be set in checks six feet apart both ways and trained up to stakes. For garden culture they should be trained on trellises. The trellises are easily made by planting posts six or eight feet apart and nailing to them slats or wire for the vines to be stretched on. Or the vines can be planted on each side of the garden walk and a slat and wire frame so constructed as to form an arch over the walk. This with the vines trained on it and the grape clusters hanging down underneath forms the most beautiful ornament that a garden can possibly have.

It is always the new wood that grows out each spring that produces the fruit. The most successful growers of grapes prune severely, cutting back each branch so as to leave one or two buds on it. On good soil these one or two buds will make a great growth of vines.

When trained on a trellise or an arched frame the vines can be allowed to obtain sufficient old growth to cover them and after that be closely pruned every year. Pruning should be done in winter or very early spring.

The above directions apply to the bunch grape. Grapes of the scuppernong type are not pruned at all, but allowed to spread at will. For these an arbor is made by planting post of cedar, sassafras or some durable wood and constructing thereon of some durable wood a frame work on which the branches can spread and be upheld by. All the

wood used in this arbor should be of the most durable kind obtainable, because a scuppernong vine lasts not for years but for generations. The vine on Roanoke Island, North Carolina, from which the first English settlers, in the New World ate grapes in 1588, is said to be still living and bearing. The vine now covers several acres.

If for any reason it should be found necessary to prune a scuppernong vine it must be done late in the fall. If done in spring or even in winter it bleeds so heavily that great harm might result. Even then it is a good plan to char or cauterize with fire the stub of the pruned vine branches.

The scuppernong, like the bunch grape, is not only a most delicious fruit, but like it it makes the most excellent wines. Scuppernong jelly made from whole grapes, hull and all, is not surpassed by another whatever.

The same manure formula recommended for strawberries should be used for grapes. As with the strawberry too much ammonia makes vines at the expense of fruit. Potash as obtained from ashes or sulphate of potash and phosphoric acid from acid phosphate, dissolved or ground bone are the properties needed.

The scuppernong grape has no enemy. The bunch grape in some sections suffers from rot. This is easily checked and a fine and never failing crop of this most delightful fruit assured by spraying with bordeax mixture. The formula for preparing this mixture is given at the end of this manual. This should be sprayed over the frames and vines before growth begins, again when the leaves come out and third time just as the grapes form. A regular spray pump is best to apply it with. But one not wishing to buy a pump for a few garden vines, can sprinkle the mixture on with a syringe made for the purpose.

ASPARAGUS.

A good asparagus bed or plot is an absolute essential of good housekeeping. This delicious esculent never fails to bear and to keep bearing. Next to rhubarb it comes the earliest of all vegetables. It is the easiest and simplest of all to cook. Tie the sprouts in a bundle, boil, take up and apply butter, salt and pepper to taste. That is all. No vegetable could be more wholesome. It not only agrees with everybody, but possesses wonderful medicinal qualities as an early spring food. It is almost a specific for certain kidney trouble.

The old theory was that an asparagus bed must be underlain with masonry to keep the roots from getting down into the bowels of the earth. The way of making a bed was to dig a trench two feet deep, four feet wide and long in proportion to the quantity desired. This pit was carefully lined, bottom and sides, with masonry and filled with rich soil and well rotted manure, thoroughly mixed. In this the roots were planted about six inches deep and a foot apart each way. More manure was added annually as a top dressing.

There is little fault to find with this mode. While the masonry did little harm in keeping the roots in, it did some good in keeping the moles out. But it is tedious and expensive, and not at all necessary.

The essentials of asparagus, as of all vegetation, and indeed of all organic life, are food and drink —manure and water. But it needs more of the latter and a great deal more of the former than almost any other plant. The excellence of the sprouts depend upon their tenderness and large size. Tenderness and size depend upon quickness of growth. Very rich soil only can give these necessary qualities. Yet such a small plot is re-

quired to make a large quantity of asparagus that one can afford to make it as rich as necessary.

Asparagus can be successfully grown within a bed, or in rows, as other vegetables. The mode should depend upon the quantity of ground at command. If limited, make a bed. If not, follow what is called field culture.

To make a bed prepare a plot four feet wide and as long as required, by spading in deeply a very liberal quantity of manure. The roots or crowns should then be set about a foot each way and about four inches deep. Deeper planting places the roots beyond the reach of the sun heat in early spring and makes the crop later.

A bed once made needs only a heavy top dressing of stable manure, fresh or rotted every winter, and to have weeds and grass kept down at all times. Watering liberally will pay well if drought occurs in bearing times. The asparagus, like all succulent vegetables, needs water in plenty, and if nature withholds her supply, it should be applied by the sprinkling pot if an unfailing supply of the best shoots are desired.

Asparagus, to be at its very best, needs plenty of room. Therefore, the best results are obtained by what is called field culture. To follow this mode plant in rows two and a half to three feet apart, and two feet apart in rows, and set the roots or crowns four inches deep. The roots should always be spread out in a natural way when planted. The soil should be enriched by plowing in plenty of manure before the planting. Top dressings can be applied annually, as with a bed. Plowing and hoeing is then given as needed, to keep down weeds and grass. In a few years, if well manured, the crowns attain enormous size and put up a prodigious number of large, delicate shoots.

Cutting can begin the second year after planting. A bed, if kept manured and free of grass and weeds, will last for many years. There are accounts of beds having done well for more than fifty years. A field would probably last still longer.

The sprouts should be cut when about six inches high. Cut them off several inches beneath the surface, but be careful not to go deep enough to cut into crown. On a well manured field or bed the sprouts spring up like magic and must be promptly cut, or they will get old and tough. Even if not needed that day cut the sprouts young and bury them head and years in a trench, covering well with moist earth. They will keep fresh and tender this way for a long time. If sprouts should, by neglect, be allowed to stand and get too old, cut and throw them away and more will come from the same crown.

The crowns continue to put up sprouts for many weeks, beginning with early spring and continuing till late. When the sprouts are no longer needed to cut or sell let them grow up into plants. This seems essential to the thriftiness of the crowns. Late the next fall cut and remove these old plants so as to prevent the seed from falling and setting the ground too thickly with plants.

Salt, to be applied as a top dressing in liberal quantities, is widely recommended for asparagus. I could never see that it did either good or harm. This experience is in accord with that of many successful growers that I have addressed on this subject.

Salt is also recommended to prevent the growth of weeds, asparagus being almost proof against its effects. But it takes a prodigious quantity for this purpose, and its effects are not lasting on rich soil. Better keep the salt in the salt gourd and kill the weeds with a weeding hoe.

Asparagus roots can be planted at any time from September 1st to May 1st. Late fall, winter or early spring is the safest time.

The Continental Plant Company, Kittrell, N. C., furnishes, at a moderate price, well developed roots or crowns of the largest, choicest and tenderest varieties.

RHUBARB OR PIE PLANT.

This is the very first vegetable that the garden affords. The fleshy part of the stalk or leaf stem is the edible part. This makes a delicious pie or tart. It also makes excellent jelly. It can also be strung and dried for winter use.

The earliness of rhubarb and its sprightly agreeable acidity is rapidly increasing its popularity. Besides being very wholesome it has a flavor that many prefer to that of any other fruit or acid whatever.

It is very easily grown. The soil should be rich as for asparagus and kept clear of weeds and grass. Plant the roots about two feet apart each way. As the leaves grow out in early spring they can be broken off next to the parent root or crown and their stems or stalks at once utilized for pies, tarts, puddings or anything in which an acid fruit can be. The leaves grow out very fast and will, on good soil, yield a liberal and continuous supply. The same roots last for years, and yield their crop every spring. Once tried no housewife will be without it. Rhubarb roots can be planted in either late fall, winter or early spring—at any time during the cold months that the ground can be prepared.

Do not gather the stalks till the plant is old enough to have grown stout. Never allow it to go to seed.

Like asparagus, the same roots will last for many

years if not allowed to seed and if weeds are kept from choking them. Even poor soil will make fair rhubarb, though it is much better when grown in rich soil.

CURRANT CULTURE.

The currant has only to be known to be appreciated as a dessert fruit. Its acidity is mild and exceedingly wholesome and agreeable, while the excellence of currant jelly has long ago passed into a proverb.

The currant, like the gooseberry, likes a partial shade, growing well between the trees in orchards. Where shade cannot be obtained deep mulching with leaves, straw or litter of any kind may be resorted to to keep the soil moist.

The currant should be set on rich soil and about four feet apart. The bushes do best when the old wood is pruned out annually. Sufficient cultivation should be given to keep down weeds and grass. Wood ashes and stable manure can be applied as a top dressing in late fall, winter or early spring. It is always best to give a good hoeing, scatter the ashes at the rate of one pound to the square yard and then top all with a heavy coating of stable manure. Never forget that a great excess of ashes are dangerous to plant growth. Ashes and stable manure lacking both currants and gooseberries can be successfully grown by using the fertilizer recommended in this manual for strawberries.

The chief enemy of the currant is the currant worm These are easily destroyed by dissolving one ounce of hellebore in three gallons of water and applying as needed with a spray pump, syringe or fine sprinkler.

HORSERADISH.

Horseradish is such an excellent condiment; it makes such a fine sauce and adds so greatly to the flavor of pickles, etc., that no garden should be without it. It, too, is easy to grow as a weed. The Continental Plant Company will sell you the roots. Plant these about two feet apart and keep clean of weeds and grass till it gets a start. After that it can do with very little cultivation. Planted one fall, winter or spring it will be ready for use the following summer. Dig it up, use the large, central roots for sauce or pickle and plant the small side roots for next season. In this way they can be grown forever.

The horseradish is the most wholesome of all condiments. Many use it who can eat no other kind. Then the great advantage of it is that it is always ready. It can be dug and used at will at any time or season.

CHAPTER XXVI.

SPRAYING FOR FUNGOUS DISEASES.

In many parts of the country the grape is subject to black rot, the raspberry to anthracnose, the gooseberry to mildew, etc. All, or nearly all, these diseases can be kept down and prevented from doing harm by the careful and timely use of fungicides, or, as is usually termed spraying, the fungicides or fungous killers being most effectively applied that way.

BORDEAUX MIXTURE.

This is the most commonly used of all fungicides. The following are the proper proportions.

the quantity of each ingredient must, of couse, be large or small, in proportion to the quantity of spraying to be done.

Water	50 gallons
Copper Sulphate (Bluestone)	6 lbs.
Unslacked lime	4 "

Place the bluestone in a thin bag and suspend it in half the quantity of water to be used. It will dissolve without attention if given a little time. Make a paste of the lime by slacking it with a very small quantity of water, and adding a quart at the time till the mixture is smooth and soft. This paste should be dissolved in half the total quantity of water to be used. Then pour the half of the water containing the bluestone and the half in which the lime has been dissolved together and you have the Bordeaux mixture ready for use. It is essential that the mixing be done as above directed. Otherwise the chemical nature of the mixture is different and the effectiveness of the fungicide much impaired. A quart or two of cheap molasses will make the mixture stick better.

Bordeaux mixture should be applied as soon as the mixing is complete by means of a spraying apparatus of a size proportionate to the quantity of work of the kind to be done. The only requisite is that it ejects the liquid with some force and in the form of a spray. This enables the operator with proper care to reach every part of the plant, tree or vine to be treated.

The sprayer most commonly used is the ordinary hand pump which fits into a water bucket and is held in place with the foot and worked by one hand, leaving one hand free to direct the nozzle. Nozzles adjustable by a screw so as to throw a fine or coarse spray can be bought to fit these pumps.

Gardners' and growers' with only a very limited amount of spraping to do can use a syringe made for the purpose. Advertisements of syraying outfits will usually be found in the *Strawberrry Specialist.*

FOR GRAPES.

In early spring clean the vineyard well, burn all prunnings, dead leaves, trash, etc. The vines and stakes or trellisses should be thoroughly sprayed just as growth begins, again a fortnight later and again just as the fruit begins to form. Should rain closely follow any of the applications another and extra one should be given as soon as the rain is over.

FOR RASPBERRIES, DEWBERRIES, BLACKBERRIES AND GOOSEBERRIES.

Spray before growth starts with bordeaux mixture made doubly strong with bluestone. The lime can be omitted this time. The chief value of lime in this mixture is that it corrects the caustic effects of the bluestone when applied to foliage. After growth starts spray with the regular bordeaux mixture and again after fruit sets. If the anthracnose is bad several sprayings during the summer will do good.

AMMONICAL SOLUTION.

One advantage of ammonical solution is that it is colorless and cannot stain the fruit even when applied late after it forms. Another advantage is that it can be prepared as a strong solution, kept and corked in a bottle or jug and diluted as needed for use. Bordeaux mixture can not be thus kept.

Fermula:

Water	45 gallons.
Strong aqua ammonia	3 pints.
Copper carbonate	5 ounces.

Make the copper carbonate into a thin paste by adding a pint and a half of water. Add the ammonia slowly. Cork tightly till needed for use. Then dilute in proportion as above given.

CHAPTER XXVII.

THE COW PEA AS A FORERUNNER OF THE STRAWBERRY AND GENERAL SOIL IMPROVER.

The value of the cow pea in preparing land for strawberries is so great that I need make no apology for devoting a chapter to it in this manual. Where the cow pea thrives, and the different varieties of it thrive over for the greater part of the United States, it restores worn-out lands faster and more economically than can be done in any other way.

The old method of sowing the peas broadcast, two bushels to the acre, is not the best way and is being largely abolished. It is better to sow in drills so that the peas can be cultivated. This increases the yield of both peas and vines, besides making the crop much earlier and less apt to suffer from drought. As only one bushel of peas is needed to sow an acre in the drill, the saving in seed will amply pay for the simple cultivation needed.

The peas should not be planted till warm weather may be counted on to set in. Cool weather, and especially cold nights, even without frost, work against it while young and tender, though in fall when the vines are stout and vigorous it will continue to grow under much less favorable conditions. We prefer to plant here from May 25th to June 15th, though very successful plantings are often made as late as July 15th.

Many years experience has convinced us that the following is the best way to grow the crop. Run off rows three feet apart. Sow in these evenly peas at the rate of one bushel to the acre. Cover very lightly, not over an inch or two deep. The pea is hard to come up if covered too deep if rain should closely follow planting and pack the soil and the sun bake a crust on it. This is especially the case on stiff land and more or less on all. We cover the seed by means of a small tooth horse cultivator from which all the teeth have been removed but one outer tooth on each side. By straddling the row these outer teeth tumble just enough earth into the open furrow in which the peas have been sown to cover them an inch or two deep. A turning plow will cover them fully four inches deep.

After this two plowings with the cultivator will be the only cultivation absolutely needed. The first plowing should be given as soon as grass begins to sprout and the second one as soon as another crop appears. A great deal of grass can be suffered to grow without much detriment to the peas, but it is cheaper to kill it now with the pea vines to overshadow and help you on the job, than to let it seed and have to fight it among the strawberry runners the following summer.

The crop matures sufficiently to cut in less than ninety days. For forage it is best to cut just as they begin to form good and a few mature. We allow most of the peas to mature and either pick them by hand or leave them to be threshed as the vines are shredded.

We cut with a mowing machine two rows at a time. The old mode was to allow the vines to sun several days and then make in shocks and let them remain until dry enough to house. We now practice a much better mode if properly carried out.

We mow the vines, being careful to see before beginning that they are wet with neither rain or dew. Right behind the mower we run a horse rake—raking the vines and stack them at once.

Our stack poles are about ten feet high, one foot of the ten being let into the ground to hold them up safely against wind. About one foot above the ground we nail cross-wise to the post two strips of split wood or two small poles, each about four feet long. These poles are to keep the vines from lying flatly on the damp ground. About one-third the way to the top nail two more strips or small poles cross-wise to the stack pole and still another pair strips cross-wise to the pole two-thirds the way up to the top. These last two pair strips are to keep the vines from settling too closely, and to keep them loose and open to ventilation.

Place the vines around the poles in stacks not over four feet in diameter. Do no trampling, of course, only let them settle by their own weight. Round off the tops and cap well with grass or any fine hay if to be had, as the pea vine is coarse and not able to turn water as well as grass or hay.

Let the vines remain in the stacks till the stalks will break on a dry day. They will then do to thresh, shred, or to house if threshing is not intended.

How long it will take them to dry out depends upon the weather. Two or three weeks usually suffices. They should not be allowed to stay out too long. Owing to the nature of the pea vine the stacks are more pervious to rain than any kinds of hay. While if properly cured and properly housed and shredded they are pound for pound worth twice as much as the best timothy hay. The chemists may not say so, but the horse, mule and cattle generally that eat them say in the limb and

in the work they can do or the milk and butter they produce respectively, say so.

Occasionally there is a fall like this (1902) so wet that it is exceedingly difficult to cure pea vines by any mode. Still we found our mode the most satisfactory. The vines are also much sweeter when cured as we do in the stack than to let them lay exposed to the sun, dew and probably rain till partially cured and then shrink, being limp they settle much closer and remain less pervious to the air than if stacked as soon as cut.

THINGS THAT SHOULD BE BORNE IN MIND BY BERRY GROWERS.

Good plants are half the battle. A well rooted, stocky, thrifty plant has every advantage over a puny, stunted one. It is not only larger at the start but it grows a great deal faster in proportion than the small plant. It has all the chances in its favor. It is easier and surer to live when first planted. Being vigorous and well rooted it stands drought or any adverse conditions better, just as the strong man stands hardship and exposure better than the weak man. When fruiting time comes around it is as sure to be better able, and apt to be many times as able, to bear a fine crop of fruit than the chance-grown scrub plant is. Therefore the wise man will plant only thoroughly reliable plants. Better good plants at any price than bad or indifferent ones as a gift. Penny wise pound foolish applies as strongly here as anywhere that I know of.

Plant the varieties suited to your needs. No end of disappointment comes from planting varieties which are not suited to your soil or climate. Buy your plants from a reliable man who describes the

varieties as they are and who can be depended on to send you not only good plants but plants pure and true to name. Deal with no other.

Don't smother your plants with attention at first and then allow weeds and grass to smother them a little later on. All the cultivation needed is enough to kill weeds and grass at first as they come and to prevent a crust from forming on the ground in summer.

Don't apply any kind of manure too heavily at one time; might almost as well dump a week's rations to your horse or cow at one time. Apply some manure when you plant; some the following fall and some early the next spring. However large quantities of manure can be applied before planting provided it is evenly broad-casted and thoroughly mixed with the soil. Then any excess of manure can hardly come in immediate contact with the plant roots.

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